

**DOCUMENT 00 01 01**

**PROJECT TITLE PAGE  
PROJECT MANUAL**

**FOR THE CONSTRUCTION OF:**

**IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDINGS 200, 300 & 800 MODERNIZATION**

**OWNER AND PROJECT SITE:**

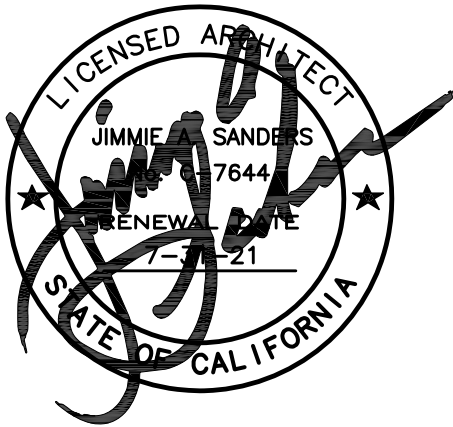
**IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
380 E ATEN RD  
IMPERIAL CA 92251  
P: (760) 355-6371**

**ARCHITECT:**

**SANDERS INC ARCHITECTURE/ENGINEERING  
1102 INDUSTRY WAY SUITE A  
EL CENTRO CA 92243  
P: (760) 353-5440  
F: (760) 353-5442**

**JIMMIE A. SANDERS  
ARCHITECT C-7644**





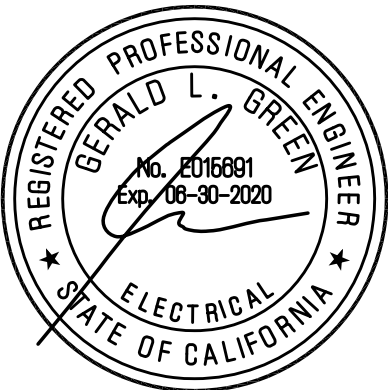
**ARCHITECT**

SANDERS, INC. ARCHITECTURE/ENGINEERING  
JIMMIE A. SANDERS, A.I.A.  
C-7644  
1102 INDUSTRY WAY  
SUITE A  
EL CENTRO, CA 92243  
(760) 353-5440



**MECHANICAL ENGINEER**

DIVISION 15 CONSULTING SERVICES  
VICTOR NEWMAN  
M-23110  
11180 TURQUOISE CIRCLE  
DEWEY, AZ 86327  
(928) 772-8448



**ELECTRICAL ENGINEER**

KRUSE AND ASSOCIATES  
GERALD L. GREEN  
E-15691  
12245 WORLD TRADE DRIVE  
SUITE E  
SAN DIEGO, CA 92128  
(858) 676-9776



**STRUCTURAL ENGINEER**

ORIE<sup>2</sup> ENGINEERING  
DONALD ORIE  
S-3838  
9750 MIRAMAR ROAD, SUITE 310  
SAN DIEGO CA 92128  
(858) 335-7643

IDENTIFICATION STAMP  
DIV. OF THE STATE ARCHITECT  
OFFICE OF REGULATION SERVICES  
APPL 04-118720  
AC \_\_\_\_\_ FLS \_\_\_\_\_ SS \_\_\_\_\_  
DATE \_\_\_\_\_

**DIVISION OF STATE ARCHITECT APPROVAL**

AC: \_\_\_\_\_  
FLS: \_\_\_\_\_  
SS: \_\_\_\_\_  
IDENTIFICATION STAMP  
DIV. OF THE STATE ARCHITECT  
APP. 04-118720 INC:  
REVIEWED FOR  
SS  FLS  HEST  ACS  ECT  
DATE: 01.16.20





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**END OF DOCUMENT 00 01 10**

**DOCUMENT 00 11 13**

**LEGAL ADVERTISEMENT  
NOTICE TO CONTRACTORS CALLING FOR BIDS**

Project: IMPERIAL VALLEY COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION

Bid Deadline:

Place of Bid Receipt: IMPERIAL VALLEY COLLEGE  
DISTRICT OFFICE  
380 E ATEN RD.  
IMPERIAL CA 92251

NOTICE IS HEREBY GIVEN that the IMPERIAL COMMUNITY COLLEGE DISTRICT of IMPERIAL COUNTY, CALIFORNIA, acting by and through its Governing Board, hereinafter referred to as "DISTRICT," will receive up to, but not later than, the above-stated time, sealed bids for the award of a contract consisting of the following bid package:

There shall be

The work consists generally of, but is not limited to,

Bids shall be received in the place identified above. Those bids timely received shall be opened and publicly read aloud at the above-stated time and place.

Proposed forms of Contract Documents are available upon request at the Architects office located at:

SANDERS, INC. ARCHITECTURE / ENGINEERING  
1102 INDUSTRY WAY SUITE A  
EL CENTRO CA 92243  
Phone: 760 353 5440  
Fax: 760 353 5442

There will be a non-refundable fee of \$100.00 required for each set of Contract Documents.

In accordance with the provisions of California Business and Professions Code Section 7028.15 and Public Contract Code Section 3300, the DISTRICT requires that the bidder possess applicable classification(s) of contractor's license(s) at the time the bid is submitted. Any bidder not so licensed at the time of the bid opening will be rejected as non-responsive.

All work must be completed within () consecutive calendar days from the date specified on the Notice to Proceed issued by the DISTRICT. Time is of the essence. Failure to complete the work within the time set forth herein will result in the imposition of liquidated damages for each day of delay, in the amount set forth in the Information for Bidders.

Each bid shall be accompanied by a bid security in the form of cash, a certified or cashier's check or bid bond in an amount not less than FIVE percent (5%) of the total bid price, payable to the District.

The DISTRICT reserves the right to reject any or all bids or to waive any irregularities or informalities in any bids or in the bidding process.

As required by Section 1773 of the California Labor Code, the California Department of Industrial Relations has determined the general prevailing rates of per diem wages in the locality in which the work is to be performed. Copies of these wage rate determinations, entitled PREVAILING WAGE SCALE, are maintained at:

DEPARTMENT OF INDUSTRIAL RELATIONS  
DIVISION OF LABOR STATISTICS AND RESEARCH  
455 GOLDEN GATE AVENUE, 8<sup>TH</sup> FLOOR  
PO BOX 420603  
SAN FRANCISCO CA 94102-0603  
415 703 4774  
[www.dir.ca.gov/dlsr/pwd](http://www.dir.ca.gov/dlsr/pwd)

and are available to any interested party upon request. The successful bidder upon award of the contract shall post a copy of this document at each work site. It shall be mandatory upon the successful bidder to whom the contract is awarded, and upon any subcontractor listed, to pay not less than the specified rates to all workers employed by them for the Project.

No contractor or subcontractor may be listed on this bid proposal unless registered with the Department of Industrial Relations ( DIR ) pursuant to Labor Code Section 1725.5. No contractor or sub-contractor may be awarded this project unless registered with the DIR pursuant to Labor Code Section 1725.5. This project is subject to compliance monitoring and enforcement by the DIR.

No bidder may withdraw any bid for a period of SIXTY (60) calendar days after the date set for the opening of bids.

Pursuant to Section 22300 of the Public Contract Code, the Agreement will contain provisions permitting the successful bidder to substitute securities for any monies withheld by the DISTRICT to ensure performance under the Agreement or permitting payment of retentions earned directly into escrow.

END OF DOCUMENT 00 11 13

DOCUMENT 00 21 13

## INSTRUCTIONS TO BIDDERS

### WARNING:

READ THIS DOCUMENT CAREFULLY. DO NOT ASSUME THAT IT IS THE SAME AS OTHER SIMILAR DOCUMENTS YOU MAY HAVE SEEN, EVEN IF FROM THE SAME DISTRICT.

**1. Preparation of Bid Form.** The DISTRICT invites bids on the form attached to be submitted at the time and place stated in the Notice Calling for Bids. Bids shall be submitted on the prescribed Bid Form, completed in full. All bid items and statements shall be properly and legibly filled out. Numbers shall be stated both in words and in figures where so indicated, and where there is a conflict in the words and the figures, the words shall govern. The signatures of all persons shall be in longhand. Prices, wording and notations must be in ink or typewritten. Erasures or other changes shall be noted over by signature of the bidder.

**2. Form and Delivery of Bids.** The bid must conform and be responsive to all Project documents and shall be made on the Bid Form provided, and the complete bid, together with any and all additional materials as required, shall be enclosed in a sealed envelope, addressed and hand delivered or mailed to the DISTRICT at:

IMPERIAL COMMUNITY COLLEGE DISTRICT  
380 W ATEN RD  
IMPERIAL CA 92251

and must be received on or before the time set forth in the Notice Calling for bids for the opening of bids. The envelope shall be plainly marked in the upper left hand corner with the bidder's name, the Project designation and the date and time for the opening of bids. It is the bidder's sole responsibility to ensure that its bid is received prior to the bid deadline. In accordance with Government Code Section 53068, any bid received after the scheduled closing time for receipt of bids shall be returned to the bidder unopened. At the time set forth in the Notice Calling for Bids for the opening of bids, the sealed bids will be opened and publicly read aloud at the place indicated in the Notice Calling for Bids. However, if the Information for Bidders calls for the prequalification of bidders pursuant to Public Contract Code Section 20111.5 only those sealed bids received from pre-qualified bidders shall be opened and publicly read aloud.

**3. Bid Security.** Each bid shall be accompanied by a bid security in the form of cash, a certified or cashier's check or bid bond in the amount of not less than five percent (5%) of the total bid price payable to the DISTRICT and shall be given as a guarantee that the bidder, if awarded the contract, will execute the Agreement within TEN (10) working days after award of the contract, and will furnish prior to the execution of the Agreement, on the prescribed forms, a satisfactory Faithful Performance Bond in an amount not less than one hundred percent (100%) of the total bid price and separate Payment (labor and material) Bond in an amount not less than one hundred percent (100%) of the total bid price in accordance with the Project documents and Civil Code Section 3248, and furnish certificates evidencing that the required insurance is in effect in the amounts set forth in the General Conditions. The Faithful Performance Bond shall remain in full force and effect through the guarantee period as specified in the General Conditions. In case of refusal or failure to timely execute the Agreement and furnish the required bonds and insurance certificates, the bid security shall be forfeited to the DISTRICT. If the Bidder elects to furnish a bid bond as its Bid Security, the Bidder shall use the bid bond form included herein.

**4. Signature.** The Bid Form, all bonds, the Designation of Subcontractors Form, all Information Required of Bidder or prequalification forms, Workers Compensation Certificate, Drug Free Workplace Certification, Non-Collusion Affidavit, the Agreement, and all Guarantees must be signed in the name of the bidder and must bear the signature of the person or persons duly authorized to sign these documents. Where indicated, if bidder is a corporation, the legal name of the corporation shall first be set forth, together with two signatures: one from among the chairman of the board, president or vice president and one from among the secretary, chief financial officer, or assistant treasurer. Alternatively, the signature of other authorized officers or agents may be affixed, if duly authorized by the corporation. Such documents shall include the title of such signatories below the signature and shall bear the corporate

seal. Where indicated, in the event that the bidder is a joint venture or partnership, there shall be submitted with the bid certifications signed by authorized officers of each of the parties to the joint venture or partnership, naming the individual who shall be the agent of the joint venture or partnership, who shall sign all necessary documents for the joint venture or partnership and, should the joint venture or partnership be the successful bidder, who shall act in all matters relative to the contract resulting therefrom for the joint venture or partnership. If bidder is an individual, his/her signature shall be placed on such documents.

**5. Modifications.** Changes in or additions to any of the bid documents, summary of the work bid upon, alternative proposals, or any other modifications which are not specifically called for by the DISTRICT may result in the DISTRICT'S rejection of the bid as not being responsive. No oral or telephonic modification of any bid will be considered. However, prior to the opening of bids, a telegraphic modification signed by bidder postmarked prior to the opening of bids or a facsimile modification duly signed by bidder received prior to the opening of bids may be considered.

**6. Erasures, Inconsistent or Illegible Bids.** The bid submitted must not contain any erasures, interlineations, or other corrections unless each such correction creates no inconsistency and is suitably authenticated by the signature(s) of the person(s) signing the bid. In the event of inconsistency between words and figures in the bid, words shall control figures. In the event that DISTRICT determines that any bid is unintelligible, illegible or ambiguous, the DISTRICT may reject such bid as not being responsive.

**7. Examination of Site and Project Documents.** At its own expense and prior to submitting its bid, each bidder shall examine all documents relating to the Project; visit the site and determine the local conditions which may in any way affect the performance of the work, including the general prevailing rate of per diem wages and other relevant cost factors; familiarize itself with all Federal, State and local laws, ordinances, rules, regulations and codes affecting the performance of the work, including the cost of permits and licenses required for the work; make such surveys and investigations, including investigation of subsurface or latent physical conditions at the site or where work is to be performed, as it may deem necessary for performance of the work at its bid price ; determine the character, quality, and quantities of the work to be performed and the materials and equipment to be provided; and correlate its observations, investigations, and determinations with all requirements of the Project . The Project documents show and describe the existing conditions as they are believed to have been used in the design of the work and are only provided as information for the bidder. DISTRICT is not making any warranties regarding said information. The DISTRICT shall not be liable for any loss sustained by the successful bidder resulting from any variance between the conditions and design data given in the Project documents and the actual conditions revealed during the bidder's pre-bid examination or during the progress of the work. Bidder agrees that the submission of a bid shall be incontrovertible evidence that the bidder has complied with all the requirements of this provision of the Information for Bidders.

**8. Withdrawal of Bids.** Any bid may be withdrawn, either personally, by written request, or by telegraphic request confirmed in the manner specified above for bid modifications, at any time prior to the scheduled closing time for receipt of bids. The bid security for bids withdrawn prior to the scheduled closing time for receipt of bids, in accordance with this paragraph, shall be returned. No bidder may withdraw any bid for a period of sixty (60) days after the date set for the opening of bids.

**9. Agreement and Bonds.** The Agreement which the successful bidder, as CONTRACTOR, will be required to execute, and the form of the payment bond which such CONTRACTOR will be required to furnish in accordance with Civil Code Section 3247 prior to execution of the Agreement, are included in the Project documents and should be carefully examined by the bidder. Unless otherwise specified in Special Conditions, the payment bond shall be in the amount not less than one hundred percent (100%) of the amount of the contract in accordance with the Project documents and Civil Code section 3248. The CONTRACTOR will also be required to furnish a separate faithful performance bond in the amount of one hundred percent (100%) of the contract and in the form included in the Project documents, and certificates of insurance as required in the contract, all prior to execution of the Agreement.

**10. Interpretation of Project Documents.** If any bidder is in doubt as to the true meaning of any part of the Project documents, or finds discrepancies in, or omissions from the drawings and specifications, a written request for an interpretation or correction thereof may be submitted to the DISTRICT. The bidder submitting the written request shall be responsible for its prompt delivery. Any interpretation or correction of the Project documents will be



made only by addendum duly issued by the District, and a copy of such addendum will be hand delivered or mailed or faxed to each bidder known to have received a set of the Project documents. No person is authorized to make any oral interpretation of any provision in the Project documents, nor shall any oral interpretation be binding on the DISTRICT. If discrepancies on drawings, or in plans or specifications, or conflicts between drawings, plans, specifications, terms or conditions exist, the interpretation of the District shall prevail. Bidder shall become familiar with the plans, specifications and drawings. SUBMITTAL OF A BID WITHOUT CLARIFICATIONS SHALL BE INCONTROVERTIBLE EVIDENCE THAT THE BIDDER HAS DETERMINED THAT THE PLANS, SPECIFICATIONS AND DRAWINGS ARE SUFFICIENT FOR BIDDING AND COMPLETING THE WORK; THAT BIDDER IS CAPABLE OF READING, FOLLOWING AND COMPLETING THE WORK IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS AND DRAWINGS; AND THAT THE PLANS, SPECIFICATIONS AND DRAWINGS FALL WITHIN AN ACCEPTABLE STANDARD FOR PLANS, SPECIFICATIONS AND DRAWINGS; AND THAT BIDDER AGREES THAT THE PROJECT CAN AND WILL BE COMPLETED ACCORDING TO THE DISTRICT'S TIMELINES AND ACCORDING TO THE PROGRESS SCHEDULE TO BE SUBMITTED BY THE SUCCESSFUL BIDDER INCORPORATING THE DISTRICT'S TIMELINES FOR COMPLETION OF THE PROJECT.

**11. Bidders Interested in More Than One Bid.** No person, firm or corporation shall be allowed to make, or file, or be interested in more than one bid for the same work unless alternate bids are specifically called for by the DISTRICT. A person, firm, or corporation that has submitted a subproposal to a bidder, or that has quoted prices of materials to a bidder, is not thereby disqualified from submitting a proposal or quoting prices to other bidders or submitting a bid on the Project.

**12. Award of Contract.** The DISTRICT reserves the right to reject any or all bids, or to waive any irregularities or informalities in any bids or in the bidding process. If two identical low bids are received from responsive and responsible bidders, the DISTRICT will determine which bid will be accepted pursuant to Public Contract Code Section 20117. The award of the contract, if made by the DISTRICT, will be by action of the governing board and to the lowest responsive and responsible bidder. In the event an award of the contract is made to bidder, and such bidder fails or refuses to execute the Agreement and provide the required documents within TEN (10) working days after the award of the contract to bidder, the DISTRICT may award the contract to the next lowest responsive and responsible bidder or release all bidders.

**13. Alternatives.** If alternate bids are called for, the contract may be awarded at the election of the governing board to the lowest responsive and responsible bidder on the base bid, or on the base bid and any alternate and any deductive or base bid and any combination of alternates and any deductives.

**14. Public Contract Code Section 20111.5 – Prequalification of Bidders**

NOT REQUIRED.

**15. Listing Subcontractors.** Each bidder shall submit, on the form furnished with the Project documents, a list of the proposed subcontractors on this Project as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 et seq.). If alternate bids are called for and the bidder intends to use different or additional subcontractors, a separate list of subcontractors must be submitted for each such alternate bid.

**16. Workers' Compensation.** In accordance with the provisions of Section 3700 of the Labor Code, the successful bidder shall secure the payment of compensation to all employees. The successful bidder who has been awarded the contract shall sign and file with DISTRICT the following certificate prior to performing the work: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract." The form of such certificate is included as a part of the Project documents.

**17. Contractor's License.** If, at the time of the bid opening date and time, bidder is not properly licensed to perform the Project in accordance with Division 3, Chapter 9, of the Business and Professions Code of the State of California and the Notice Calling for Bids, such bid will be rejected as non-responsive. Pursuant to Business

and Professions Code Section 7028.15, no payment shall be made for work or materials under the contract unless and until the Registrar of Contractors verifies to the DISTRICT that the bidder was properly licensed at the time the bid was submitted. Any bidder not so licensed is subject to penalties under the law and the contract will be considered void. If the license classification specified hereinafter is that of a "specialty contractor" as defined in Section 7058 of the California Business and Professions Code, the specialty contractor awarded the contract for this work shall construct a majority of the work, in accordance with the provisions of California Business and Professions Code Section 7059.

**18. Anti-Discrimination.** It is the policy of the DISTRICT that in connection with all work performed under contracts, there be no unlawful discrimination against any prospective or active employee engaged in the work because of race, color, ancestry, national origin, religious creed, sex, age or marital status physical disability, mental disability, or medical condition. The successful bidder agrees to comply with applicable federal and state laws including, but not limited to, the California Fair Employment and Housing Act, beginning with Government Code Section 12900 and Labor Code Section 1735. In addition, the successful bidder agrees to require like compliance by any subcontractors employed on the work by such bidder.

**19. Hold Harmless.** The successful bidder awarded the contract shall indemnify and hold harmless the DISTRICT, its governing board, officers, agents, and employees from every claim or demand made, and every liability, loss, damage, or expense, of any nature whatsoever, which may be incurred by reason of:

(a) Liability for damages for (1) death or bodily injury to person(s); (2) injury to, loss or theft of property; or (3) any other loss, damage or expense arising under either (1) or (2) above, sustained by the bidder upon or in connection with the work called for in this Project, except for liability resulting from the sole active negligence, or willful misconduct of the DISTRICT.

(b) Any injury to or death of any person(s) or damage to, loss or theft of any property caused by any act, omission, neglect, or default of the bidder, or any person, firm, or corporation employed by the bidder CONTRACTOR, either directly or by independent contract, arising out of, or in any way connected with the work covered by this Project, whether said injury or damage occurs either on or off District property, if the liability arose from the negligence or willful misconduct of anyone employed by the bidder, either directly or by independent contract.

The bidder, at bidder own expense, cost, and risk shall defend at DISTRICT's request, any and all actions, suits, or other proceedings that may be brought or instituted against the DISTRICT, its governing board, its officers, agents or employees, on any such claim or liability, and shall pay or satisfy any judgment that may be rendered against the DISTRICT, its governing board, its officers, agents or employees in any action, suit or other proceedings as a result thereof.

**20. Substitutions.**

(a) Should the bidder wish to request prior to bid opening, any substitution for the materials, process, service or equipment specified, the bidder shall submit a written request at least ten (10) working days before the bid opening date and hour. If the substituted item is acceptable, the DISTRICT will approve it in an Addendum issued to all bidders of record. Requests received less than ten (10) working days prior to bid opening will not be considered.

(b) With respect to any materials, process, service or equipment listed in the bid, unless the bidder clearly indicates in its bid that it is proposing to use an "equal" product, its bid shall be considered as offering the material, process, service or equipment referred to by the brand name or trade name specified.

(c) The brand name or trade name, if any, of a proposed substitute item shall be inserted in the space provided in the bid or shall be otherwise clearly identified in the bid. The awarding of the contract to a bidder who has indicated in its bid that it is proposing to use an "equal" item shall not constitute an admission by the DISTRICT of the equality of that item. It is expressly understood and agreed by the bidder that, in so awarding this contract, the DISTRICT reserves the right to reject any such proposed substituted item. It is further expressly understood and agreed by bidder that in the event the DISTRICT rejects a proposed "equal" item, the bidder will then supply the material, process,

service or equipment designated by brand name or trade name or a substitute therefore which meets with the approval of the DISTRICT.

(d) With respect to all proposed substitutions of "equal" items, the bidder to whom the contract has been awarded shall submit all pertinent and appropriate data substantiating its request for substitutions within thirty-five (35) days after the award of the contract. The DISTRICT is not responsible for locating or securing any information which is not included in such substantiating data. The burden of proof as to the quality or suitability of proposed substituted items shall be borne by the bidder. The DISTRICT shall be the sole judge as to the quality and suitability of proposed substituted items, and decisions of the DISTRICT shall be final and conclusive. Unless extended by the mutual agreement of the parties, the DISTRICT shall notify the successful bidder of the decision concerning the proposed substitution of "equal" items within thirty (30) days after the submission by the bidder of the bidder's substantiating data. Also such decisions by the DISTRICT shall be in writing, and no proposed substituted item shall be deemed approved unless the DISTRICT has so indicated in writing. These time limitations shall be complied with strictly, and in no case will an extension of time for completion be granted because of the bidder's failure to request the substitution of an item at the times and in the manner set forth herein.

(e) Price, fitness and quality being equal with regard to supplies, the DISTRICT may prefer supplies grown, manufactured, or produced in California and may next prefer supplies partially manufactured, grown, or produced in California provided the bids of said suppliers or the prices quoted by them do not exceed by more than 5% of the lowest bids/prices quoted by out of state suppliers, the major portion of the manufacture of the supplies is not done outside of California and the public good will be served thereby. Government Code section 4330-4334.

**21. Presumption of Surety Qualifications.** All surety companies with a minimum rating of "A-VIII," as rated by the current edition of Best's Key Rating Guide, published by A.M. Best Company, Oldwick, New Jersey 08858 and qualified to do business in California shall be presumed to be satisfactory to the DISTRICT for the issuance of insurance and bonds. In the alternative, any surety company who satisfies the requirements set forth in California Code of Civil Procedure Section 995.660 shall be accepted and approved for the issuance of bonds.

**22. Liquidated Damages.** All work must be completed within the time limits set forth in the Notice Calling for Bids. It is agreed that damages for the failure to complete the Project described herein within the time limits required are impossible to ascertain but that the sum of Five Hundred Dollars (\$ 500.00) per day is a reasonable estimate. Should the work not be completed within the specified time for completion, the successful bidder awarded the contract shall be liable for liquidated damages, payable to the DISTRICT, in an amount of Five Hundred Dollars (\$ 500.00) for each consecutive calendar day of delay in completion. Such damages shall be deducted from any payments due or to become due to the successful bidder.

**23. Drug-Free Workplace Certification.** Pursuant to Government Code Sections 8350 et seq., the successful bidder will be required to execute a Drug-Free Workplace Certificate upon execution of the Agreement. The bidder will be required to take positive measures outlined in the certificate in order to insure the presence of a drug-free workplace. Failure to abide with the conditions set forth in the Drug-Free Workplace Act could result in penalties including termination of the Agreement or suspension of payment thereunder.

**24. Non-collusion Affidavit.** In accordance with the provisions of Section 7106 of the Public Contract Code, each bid must be accompanied by a non-collusion affidavit properly notarized.

**25. Escrow Agreement.** Public Contract Code Section 22300 permits the substitution of securities for any monies withheld by a public agency to ensure performance under a contract. At the request and expense of the successful bidder awarded the contract, securities equivalent to the amount withheld as retention 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 successful bidder. The DISTRICT retains the sole discretion to approve the bank selected by the successful bidder to serve as escrow agent. Upon satisfactory completion of the contract, the securities shall be returned to the successful bidder. Securities eligible for investment shall include those listed in Government Code Section 16430 or bank or savings and loan certificates of deposit. The successful bidder shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

In the alternative, under Section 22300, the successful bidder may request DISTRICT to make payment of earned retentions directly to the escrow agent at the expense of the successful bidder. Also at the successful bidder's expense, the successful bidder may direct investment of the payments in securities, and the successful bidder shall receive interest earned on such investment upon the same conditions as provided for securities deposited by successful bidder. Upon satisfactory completion of the contract, successful bidder shall receive from the escrow agent all securities, interest and payments received by escrow agent from DISTRICT pursuant to the terms of Section 22300. The successful bidder shall pay to each subcontractor, not later than 20 days after receipt of such payment, the respective amount of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld to insure performance of the successful bidder. Such bidder must complete and execute the Escrow Agreement and submit it to the DISTRICT.

**26. Change Orders.** All change order requests must be submitted in the form set forth in the Project documents and pursuant to Article 59 of the General Conditions. The amount of allowable charges submitted pursuant to a change order shall be limited to the charges allowed under Article 59 of the General Conditions. Indirect, consequential and incidental costs, project management costs, extended home office and field office overhead, administrative costs and profit and other charges not specifically authorized under Article 59 of the General Conditions will not be allowed.

**27. Executed Copies.** The number of executed copies of the Agreement, the Faithful Performance Bond, the Payment Bond and the Worker's Compensation Certificate required is three (3).

**28. Department of Industrial Relations Registration and Monitoring**

- (a) No contractor or subcontractor may be listed on this bid proposal unless registered with the Department of Industrial Relations (DIR) pursuant to Labor Code Section 1725.5.
- (b) No contractor or sub-contractor may be awarded this project unless registered with the DIR pursuant to Labor Code Section 1725.5
- (c) Contractor shall submit proof of registration with bid documents.
- (d) This project is subject to compliance monitoring and enforcement by the DIR. For information and to register online, visit the DIR's public works website: <http://www.dir.ca.gov/Public-Works/PublicWorks.html>. Questions regarding contractor registration shall be directed to the DIR by e-mail to: SB854@dir.ca.gov.

**29. Required Documents at Bid Opening.** All bidders are required to execute and submit the documents listed below. All documents are attached.

- Bid Form
- Bid Bond
- Information Required of Bidders
- Designation of Subcontractors
- Non-Collusion Affidavit (Notarized)
- Proof of DIR Registration

**30. Required Documents upon Award of Contract.** The successful bidder is required to execute and submit the documents listed below as per the Notice of Award. All documents are attached.

- Worker's Compensation Certificate
- Faithful Performance Bond
- Payment Bond
- Agreement
- Drug Free Workplace Certificate

**31. Schedule of Events**

IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION

OCTOBER 2019

Advertise Project (Invitation to Bid):

Pre-Bid Conference:

Bid Deadline:

Board Meeting:

Notice of Award:

Start Construction:

Complete Construction:

END OF DOCUMENT 00 21 13



**DOCUMENT 00 41 13**

**BID FORM**

Name of Bidder:

To: IMPERIAL COMMUNITY COLLEGE DISTRICT, acting by and through its Governing Board, herein called the "DISTRICT."

1. Pursuant to your Notice Calling for Bids and the other documents relating thereto, the undersigned Bidder, having become familiarized with the complete contract, as defined in the Agreement, the local conditions affecting the performance of the work and the cost of the work at the place where the work is to be done, hereby proposes and agrees to be bound by all the terms and conditions of the complete contract and agrees to perform, within the time stipulated, the contract, including all of its component parts, and everything required to be performed, and to provide and furnish and pay for any and all of the labor, materials, tools, expendable equipment, and all applicable taxes, utility and transportation services necessary to perform the work and complete in a good workmanlike manner all of the work required, including sheeting, shoring and bracing, or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, in connection with the following:

Project: IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION

All in strict conformity with the complete contract, as defined in the Agreement, including Addenda Nos. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_, on file at the office of the said DISTRICT for the sum of:

BASE BID \_\_\_\_\_ (\$ \_\_\_\_\_)

ALTERNATE DEDUCT 1 \_\_\_\_\_  
Deduct from BASE BID (\$ \_\_\_\_\_)  
CMU Fence at Electrical Yard

ALTERNATE DEDUCT 2 \_\_\_\_\_  
Deduct from BASE BID (\$ \_\_\_\_\_)  
Mechanical Equipment Screens

ALTERNATE DEDUCT 3 \_\_\_\_\_  
Deduct from BASE BID (\$ \_\_\_\_\_)  
Tubular Daylighting Devices

Each individual bid term shall be determined from visiting the work site, reviewing the plans and specifications and all other portions of the Project documents, and shall include all items necessary to complete the work, including the assumption of all obligations, duties, and responsibilities necessary to the successful completion of the contract, and the furnishing of all materials and equipment required to be incorporated in and form a permanent part of the work, the furnishing of tools, equipment, supplies, transportation, facilities, labor, superintendence, and services required to perform and complete the work, and bonds, insurance and submittals, all as per the requirements of the Project documents, whether or not expressly listed or designated.

2. It is understood that the DISTRICT reserves the right to reject this bid and that this bid shall remain open and not be withdrawn for the period specified in the Notice Calling for Bids.

3. The required bid security is attached.
4. The required list(s) of proposed subcontractors is attached hereto, and the undersigned represents and warrants that such list(s) is complete and in compliance with the Subletting and Subcontracting Fair Practices Act.
5. It is understood and agreed that if written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the bidder after the opening of the bid, and within the time this bid is required to remain open, or at any time thereafter before this bid is withdrawn, the bidder will execute and deliver to the DISTRICT the Agreement and will also furnish and deliver to the DISTRICT the Faithful Performance Bond and a separate Payment Bond as specified, and certificates of insurance. The bidder further agrees that the work under the contract shall be commenced by the bidder, if awarded the contract, on or before the TENTH (10) day after receiving the DISTRICT's Notice to Proceed, and shall be completed by the bidder in the time specified by the DISTRICT.
6. Communications conveying acceptance of bid, requests for additional information or other correspondence should be addressed to the bidder at the address stated below.
7. The name of all persons interested in the bid as principals are as follows:

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(IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if bidder or other interested person is an individual, state first and last name in full.)

8. If the bidder is a corporation, the undersigned hereby represents and warrants that the corporation is duly incorporated and is in good standing in the State of \_\_\_\_\_ and that \_\_\_\_\_, whose title is \_\_\_\_\_, is authorized to act for and bind the corporation.

9. In submitting this bid, the bidder offers and agrees that if the bid is accepted, it will assign to 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. Section 15) or under the Cartwright Act (Business & Professions Code Section 16700 et seq.) arising from purchases of goods, materials, or services by the bidder for sale to the DISTRICT pursuant to the bid. Such assignment shall be made and become effective at the time the DISTRICT tenders final payment under the contract. (Public Contract Code Section 7103.5; Government Code Section 4552).

10. It is understood and agreed that should bidder fail or refuse to return executed copies of the Agreement, Workers Compensation Certificate, insurance certificates, and required bonds to the DISTRICT within the time specified, the bid security shall be forfeited to the DISTRICT.

11. The undersigned hereby warrants that the bidder has an appropriate license, License No. \_\_\_\_\_, Class \_\_\_\_\_, that such license entitles bidder to provide the work, that such license will be in full force and effect throughout the duration of performance under this contract, and that any and all subcontractors to be employed by the undersigned will have appropriate licenses.

12. The bidder hereby certifies that it is, and at all times during the performance of work hereunder shall be, in full compliance with the provisions of the Immigration Reform and Control Act of 1986 ("IRCA") in the hiring



of its employees, and the bidder shall indemnify, hold harmless and defend the DISTRICT against any and all actions, proceedings, penalties or claims arising out of the bidder's failure to comply strictly with the IRCA.

13. It is understood and agreed that if requested by the DISTRICT, the bidder shall furnish a notarized financial statement, references, and other information required by the District sufficiently comprehensive to permit an appraisal of bidder's ability to perform the contract.

14. The undersigned hereby warrants that all work shall be completed within ( ) consecutive calendar days from the date specified on the Notice to Proceed issued by the District. Time is of the essence. The undersigned agrees that failure to complete the work within the time set forth herein will result in the imposition of liquidated damages for each consecutive calendar day of delay in the amount of \$ 500.00.

15. The required non-collusion affidavit properly notarized is attached.

16. It is understood and agreed that all change order requests must be submitted in the form set forth in the Project documents and pursuant to Article 59 of the General Conditions. The amount of allowable charges submitted pursuant to a change order shall be limited to the charges allowed under Article 59 of the General Conditions. Indirect, consequential and incidental costs, project management costs, extended home office and field office overhead, administrative costs and profit and other charges not specifically authorized under Article 59 of the General Conditions will not be allowed.

The undersigned hereby declares that all of the representations of this bid are made under penalty of perjury under the laws of the State of California.

**Individual**

Name: \_\_\_\_\_

Signed by: \_\_\_\_\_

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_

**Partnership**

Name: \_\_\_\_\_

Signed by: \_\_\_\_\_, Partner

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Business Address: \_\_\_\_\_  
\_\_\_\_\_

Other Partners: \_\_\_\_\_  
\_\_\_\_\_

\*\*\*\*\*

**Corporation**

Name: \_\_\_\_\_

(a \_\_\_\_\_ Corporation)

Business Address: \_\_\_\_\_  
\_\_\_\_\_

Telephone: \_\_\_\_\_

Signed by: \_\_\_\_\_, President, Date:

Print Name: \_\_\_\_\_, President

Signed by: \_\_\_\_\_, Secretary, Date:

Print Name: \_\_\_\_\_, Secretary

[Seal]

**Joint Venturer**

Name: \_\_\_\_\_

Signed by: \_\_\_\_\_, Joint Venturer

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_

Other Parties to Joint Venture:

If an individual: \_\_\_\_\_  
(Signature)

Print Name: \_\_\_\_\_

Doing Business as: \_\_\_\_\_;

If a Partnership: \_\_\_\_\_

Signed by: \_\_\_\_\_, Partner

Print Name: \_\_\_\_\_

If a Corporation: \_\_\_\_\_  
(a \_\_\_\_\_ Corporation)

Signed By: \_\_\_\_\_ Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

(Seal)

END OF DOCUMENT 00 41 13



**DOCUMENT 00 43 13**

**BID BOND**

KNOW ALL PERSONS BY THESE PRESENTS, that we, \_\_\_\_\_,  
\_\_\_\_\_, as Principal, and \_\_\_\_\_,  
Surety, are held and firmly bound unto the IMPERIAL COMMUNITY COLLEGE DISTRICT, hereinafter called the DISTRICT, in the sum of FIVE PERCENT (5%) OF THE TOTAL AMOUNT OF THE BID of the Principal submitted to the said DISTRICT for the work described below for the payment of which sum in lawful money of the United States, well and truly to be made, we jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of this obligation is such that whereas the Principal has submitted the accompanying bid dated \_\_\_\_\_, for: \_\_\_\_\_

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified therein after the opening of the same, or, if no period be specified, within sixty (60) days after said opening; and if the Principal is awarded the contract, and shall within the period specified therefore, or, if no period be specified, within five (5) working days after the award of the contract, enter into a written contract with the DISTRICT, in accordance with the bid as accepted and give bonds with good and sufficient surety or sureties, as may be required for the faithful performance and proper fulfillment of such contract and for the payment for labor and materials used for the performance of the contract, then the above obligation shall be void and of no effect, otherwise to remain in full force and effect.

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

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

IN WITNESS WHEREOF, the parties have executed this instrument under their several seals this day of \_\_\_\_\_, 20\_\_\_\_, the name and corporate seal of each corporate party being hereto affixed and duly signed by its undersigned authorized representative.

(Corporate Seal of  
Principal, if  
Corporation)

Principal (Proper Name of Bidder)

By:

Signature \_\_\_\_\_

Print Name \_\_\_\_\_

Title \_\_\_\_\_

(Corporate Seal  
of Surety)

Surety

By:

Signature \_\_\_\_\_

Print Name \_\_\_\_\_

Title \_\_\_\_\_

Address \_\_\_\_\_

Telephone No. \_\_\_\_\_

END OF DOCUMENT 00 43 13

**DOCUMENT 00 43 36**

**DESIGNATION OF SUBCONTRACTORS**

In compliance with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 et. seq.) and any amendments thereof, each bidder shall set forth below: (a) the name and the location of the place of business of each subcontractor who will perform work or labor or render service to the bidder (prime contractor) in or about the construction of the work or improvement to be performed under this contract or a subcontractor licensed by the State of California who, under subcontract to the bidder (prime contractor), specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent of the bidder's (prime contractor's) total bid and (b) the portion of the work which will be done by each subcontractor. The bidder (prime contractor) shall list only one subcontractor for each such portion as is defined by the bidder (prime contractor) in this bid.

If a bidder (prime contractor) fails to specify a subcontractor or if a bidder (prime contractor) specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of one percent of the bidder's (prime contractor's) total bid, bidder shall be deemed to have agreed that bidder is fully qualified to perform that portion, and that bidder alone shall perform that portion.

No bidder (prime contractor) whose bid is accepted shall (a) substitute any subcontractor, (b) permit any subcontractor to be voluntarily assigned or transferred or allow it to be performed by any one other than the original subcontractor listed in the original bid, or (c) sublet or subcontract any portion of the work in excess of one-half of one percent of the bidder's (prime contractor's) total bid as to which the original bid did not designate a subcontractor, except as authorized in the Subletting and Subcontracting Fair Practices Act. Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the bidder's (prime contractor's) total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, only after a finding reduced to writing as a public record of the District awarding this contract setting forth the facts constituting the emergency or necessity.

Note: If alternate bids are called for and bidder intends to use a different or additional subcontractor(s) on the alternates, a separate list of subcontractors must be provided for each such alternate. Identify additional list of subcontractors by Alternate Bid No. (form enclosed)

Note: Bidder is only required to provide Type of Trade, Lab or Service, Name of Subcontractor and City at time of bid opening. The successful bidder is required to provide additional information requested below within 24 hours of bid opening.

Type of Trade, Labor or Service	Name and License # of Subcontractor	City and Telephone #





**DOCUMENT 00 45 13**

**INFORMATION REQUIRED OF BIDDERS**

**Imperial Community College District  
Imperial Valley College  
380 E Aten Rd  
Imperial CA 92251**

**A. DOCUMENTS SUBMITTED WITH BID FORM**

1. Attachment - Document 004113 - Bid Form
2. Attachment - Document 004313 - Bid Bond
4. Attachment - Document 004336 - Designation of Subcontractors
3. Attachment - Document 004513 - Information Required of Bidders
5. Attachment - Document 004519 - Noncollusion Affidavit
6. Proof of DIR Registration

**B. DOCUMENTS REQUIRED (10) DAYS AFTER AWARD**

1. Attachment - Document 004526 - Contractors Cert. Workers Compensation
2. Attachment - Document 005213- Agreement
3. Attachment - Document 006113.13 - Faithful Performance Bond
4. Attachment - Document 006113.16 - Payment Bond
5. Attachment - Document 006291 - Drug Free Workplace Certification

**C. BIDDER REFERENCES AND RESPONSIBILITY INFORMATION**

1. The Imperial Community College District expressly reserves the right to reject the bid of any bidder who, upon investigation, has been determined to fail to complete similar contracts in a timely fashion or in a satisfactory manner. Such rejection would, if applicable, be based upon the principle that the bidder is “non-responsible” and poses a substantial risk of being unable to complete the work in a cost-effective, professional and timely manner.
2. In performing the above-described responsibility determination, the District reserves the right to utilize all possible sources of information in making its determination, including but not limited to: inquiries to regulatory State Boards and agencies; Dun and Bradstreet credit reports, inquiries to companies and public entities for which the contractor has previously performed work, reference checks and examination of all public records.
3. The bidder must provide the following information:

a. Firm Name and Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b. Telephone: \_\_\_\_\_

c. Type of Firm: Individual \_\_\_\_\_  
(check one) Partnership \_\_\_\_\_  
Corporation \_\_\_\_\_

- d. Contractor's License: Primary Class \_\_\_\_\_
  - e. License No. \_\_\_\_\_ License Expiration Date: \_\_\_\_\_
  - f. Names and titles of all officers of the firm:  
  
\_\_\_\_\_
  - g. Number of years as a contractor in construction of this type: \_\_\_\_\_
4. The bidder must also demonstrate knowledge of school construction techniques and should possess a working ability to perform similarly-sized construction work for a public agency. This knowledge and ability shall be shown by furnishing the name, current phone number, address, point of contact and scope of work for at least three (3) customers served within the past three (3) years with requirements similar to the needs of the District.
- a. **FAILURE TO FURNISH THE REFERENCES (IN THE COMPLETE FORMAT REQUIRED) MAY CAUSE YOUR BID TO BE REJECTED AS NON-RESPONSIVE.**

EXAMPLE: Your references should be listed in the following format (facts are example only)

- (a) Work for X Y Z Unified School District
- (b) Phone # (222) 123-4567
- (c) 999 Holly Drive, L.A., CA 92000
- (d) Contact: J.Q. Jones III at above #
- (e) Renovated Hills High in 1990 for \$1.3 Million.

Bidder's Name: \_\_\_\_\_

Reference #1

District or Entity:

Phone #:

Address:

Name of Contact:

Scope of Work & \$ Amount:

Reference #2

District or Entity:

Phone #:

Address:

Name of Contact:

Scope of Work & \$ Amount:

Reference #3

District or Entity:

Phone #:

Address:

Name of Contact:

Scope of Work & \$ Amount:

END OF DOCUMENT 00 45 13



**DOCUMENT 00 45 19**

**NONCOLLUSION AFFIDAVIT  
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID**

(Public Contract Code Section 7106)

State of \_\_\_\_\_

County of \_\_\_\_\_

\_\_\_\_\_, being first duly sworn, deposes and says that he or she is \_\_\_\_\_ of \_\_\_\_\_, the party making the foregoing bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

\_\_\_\_\_  
Signature of Bidder

**NOTARY FOR NONCOLLUSION AFFIDAVIT**

Subscribed and sworn to (or affirmed) before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_ .

[SEAL OF NOTARY]

\_\_\_\_\_  
Signature of Notary

\_\_\_\_\_  
Typed Name of Notary

END OF DOCUMENT 00 45 19



**DOCUMENT 00 45 26**

**WORKERS' COMPENSATION CERTIFICATE**

Labor Code Section 3700.

"Every employer except the state shall secure the payment of compensation in one or more of the following ways:

(a) By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this state.

(b) By securing from the Director of Industrial Relations a certificate of consent to self-insure either as an individual employer or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

(c) For any county, city, city and county, municipal corporation, public district, public agency or any political subdivision of the state, including each member of a pooling arrangement under a joint exercise of powers agreement (but not the state itself), by securing from the Director of Industrial Relations a certificate of consent to self-insure against workers' compensation claims, which certificate may be given upon furnishing proof satisfactory to the director of ability to administer workers' compensation claims properly, and to pay workers' compensation claims that may become due to its employees. On or before March 31, 1979, a political subdivision of the state which, on December 31, 1978, was uninsured for its liability to pay compensation, shall file a properly completed and executed application for a certificate of consent to self-insure against workers' compensation claims. The certificate shall be issued and be subject to the provisions of Section 3702."

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

\_\_\_\_\_  
Name of the Contractor

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

(In accordance with Article 5 [commencing at Section 1860], Chapter 1, Part 7, Division 2 of the Labor Code, the above certificate must be signed and filed with the awarding body prior to performing any work under the contract.)

END OF DOCUMENT 00 45 26





**DOCUMENT 00 52 13**

**AGREEMENT**

THIS AGREEMENT, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, in the County of Imperial, State of California, is by and between IMPERIAL COMMUNITY COLLEGE DISTRICT, (hereinafter referred to as "DISTRICT" ), and \_\_\_\_\_ (hereinafter referred to as "CONTRACTOR").

The DISTRICT and the CONTRACTOR, for the consideration stated herein, agree as follows:

1. The complete contract includes all of the Project documents, including

- The Notice Calling For Bids
- Instructions to Bidders
- Bid Form
- Bid Bond
- Designation of Subcontractors
- Information Required of Bidders
- Non-collusion Affidavit
- Proof of DIR Registration
- Workers' Compensation Certificate
- Agreement
- Faithful Performance Bond
- Payment Bond
- Drug Free Workplace Certification
- Insurance Certificates
- General Conditions
- Special Conditions
- Plans, Drawings, Specifications
- Addenda Numbers \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

and all modifications and amendments thereto, by this reference incorporated herein. The Project documents are complementary, and what is called for by any one shall be as binding as if called for by all.

2. CONTRACTOR shall perform within the time set forth in Paragraph 4 of this Agreement everything required to be performed, and shall provide and furnish all the labor, materials, necessary tools, expendable equipment, and all utility and transportation services as described in the complete contract and required for construction of:

IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION

All of said work to be performed and materials to be furnished shall be completed in a good workmanlike manner in strict accordance with the plans, drawings, specifications and all provisions of the complete contract as hereinabove defined. The CONTRACTOR shall be liable to the DISTRICT for any damages arising as a result of a failure to fully comply with this obligation, and the CONTRACTOR shall not be excused with respect to any failure to so comply by any act or omission of the Architect, Engineer, Inspector, Division of State Architect, or representative of any of them, unless such act or omission actually prevents the CONTRACTOR from fully complying with the requirements of the project documents, and unless the CONTRACTOR protests at the time of such alleged prevention that the act or omission is preventing the CONTRACTOR from fully complying with the project documents. Such protest shall not be effective unless reduced to writing and filed with the DISTRICT within three (3) working days of the date of occurrence of the act or omission preventing the CONTRACTOR from fully complying with the Project documents.

3. DISTRICT shall pay to the CONTRACTOR, as full consideration for the faithful performance of the contract, subject to any additions or deductions as provided in the Project documents, the sum of Dollars (\$ \_\_\_\_\_ ).

4. The work shall be commenced on or before the TENTH (10) day after receiving the DISTRICT'S Notice to Proceed and shall be completed within ( ) consecutive calendar days from the date specified in the Notice to Proceed.

5. Time is of the essence. If the work is not completed in accordance with Paragraph 4 above, it is understood that the DISTRICT will suffer damage. It being impractical and infeasible to determine the amount of actual damage, in accordance with Government Code Section 53069.85, it is agreed that CONTRACTOR shall pay to DISTRICT as fixed and liquidated damages, and not as a penalty, the sum of Five Hundred Dollars (\$ 500.00) for each calendar day of delay until work is completed and accepted. This amount shall be deducted from any payments due to or to become due to CONTRACTOR. CONTRACTOR and CONTRACTOR'S surety shall be liable for the amount thereof. Time extensions may be granted by the DISTRICT as provided in Article 63 of the General Conditions.

6. In the event said CONTRACTOR fails to furnish tools, equipment, or labor in the necessary quantity or quality, or fails to prosecute the work or any part thereof contemplated by this Agreement in a diligent and workmanlike manner, the Superintendent or designee shall so certify to the Governing Board of the DISTRICT, and if the CONTRACTOR for a period of ten (10) calendar days after receipt of written demand from DISTRICT to do so, fails to furnish tools, equipment, or labor in the necessary quantity or quality, and to prosecute said work and all parts thereof in a diligent and workmanlike manner, or after commencing to do so within said ten (10) calendar days, fails to continue to do so, then the DISTRICT may exclude the CONTRACTOR from the premises, or any portion thereof, and take possession of said premises or any portion thereof, together with all material and equipment thereon, and may complete the work contemplated by this Agreement or any portion of said work, either by furnishing the tools, equipment, labor or material necessary, or by letting the unfinished portion of said work, or the portion taken over by the DISTRICT to another contractor, or by a combination of such methods. In any event, the procuring of the completion of said work, or the portion thereof taken over by the DISTRICT, shall be a charge against the CONTRACTOR, and may be deducted from any money due or becoming due CONTRACTOR from the DISTRICT, or the CONTRACTOR shall pay the DISTRICT the amount of said charge, or the portion thereof unsatisfied. The sureties, provided for under this Agreement shall become liable for payment should CONTRACTOR fail to pay in full any said cost incurred by the DISTRICT.

7. The CONTRACTOR agrees to and does hereby indemnify and hold harmless the DISTRICT, its governing board, officers, agents, and employees from every claim or demand made, and every liability, loss, damage, or expense, of any nature whatsoever, which may be incurred by reason of:

(a) Liability for damages for (1) death or bodily injury to persons; (2) injury to, loss or theft of property; or (3) any other loss, damage or expense arising under either (1) or (2) above, sustained by the CONTRACTOR upon or in connection with the work called for in this Project, except for liability resulting from the sole active negligence, or willful misconduct of the DISTRICT.

(b) Any injury to or death of any person(s) or damage, loss or theft of any property caused by any act, neglect, default or omission of the CONTRACTOR, or any person, firm, or corporation employed by the CONTRACTOR, either directly or by independent contract, arising out of, or in any way connected with the work covered by this Agreement, whether said injury or damage occurs either on or off District property, if the liability arose from the sole negligence or willful misconduct of anyone employed by the CONTRACTOR, either directly or by independent contract,

The CONTRACTOR, at CONTRACTOR'S own expense, cost, and risk shall defend any and all actions, suits, or other proceedings that may be brought or instituted against the DISTRICT, its governing board, officers, agents or employees, on any such claim, demand or liability, and shall pay or satisfy any judgment that may be rendered against the DISTRICT, its governing board, officers, agents or employees in any action, suit or other proceedings as a result thereof.

8. CONTRACTOR shall take out, prior to commencing the work, and maintain, during the life of this contract, and shall require all subcontractors, if any, whether primary or secondary, to take out and maintain:

Public Liability Insurance for injuries including accidental death, to any one person in an amount not less than \$ 1,000,000.00

and

Subject to the same limit for each person on account of one accident, in an amount not less than \$ 1,000,000.00

Property Damage Insurance in an amount not less than \$ 1,000,000.00

Course of Construction Insurance without exclusion or limitation in an amount not less than \$ 1,000,000.00

Insurance Covering Special Hazards: The following special hazards shall be covered by rider or riders to above-mentioned public liability insurance or property damage insurance policy or policies of insurance, or by special policies of insurance in amounts as follows:

Automotive and truck where operated in amounts as above

Material hoist where used in amounts as above

9. Public Contract Code Section 22300 permits the substitution of securities for any monies withheld by a public agency to ensure performance under a contract. At the request and expense of the CONTRACTOR, securities equivalent to the amount withheld shall be deposited with the public agency, or with a state or federally chartered bank in California as the escrow agent, who shall then pay such monies to the CONTRACTOR. The District retains the sole discretion to approve the bank selected by the CONTRACTOR to serve as escrow agent. Upon satisfactory completion of the contract, the securities shall be returned to the CONTRACTOR. Securities eligible for investment shall include those listed in Government Code Section 16430 or bank or savings and loan certificates of deposit. The CONTRACTOR shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

In the alternative, under Section 22300, the CONTRACTOR may request DISTRICT to make payment of earned retention directly to the escrow agent at the expense of the CONTRACTOR. Also at the CONTRACTOR's expense, the CONTRACTOR may direct investment of the payments in securities, and the CONTRACTOR shall receive interest earned on such investment upon the same conditions as provided for securities deposited by CONTRACTOR. Upon satisfactory completion of the contract, CONTRACTOR shall receive from the escrow agent all securities, interest and payments received by escrow agent from DISTRICT pursuant to the terms of Section 22300. CONTRACTOR shall pay to each subcontractor, not later than 20 days after receipt of such payment, the respective amount of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld to insure performance of the CONTRACTOR.

10. If CONTRACTOR is a corporation, the undersigned hereby represents and warrants that the corporation is duly incorporated and in good standing in the State of \_\_\_\_\_, and that \_\_\_\_\_, whose title is \_\_\_\_\_, is authorized to act for and bind the corporation.

11. Each and every provision of law and clause required by law to be inserted in this Agreement shall be deemed to be inserted herein and the Agreement 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 currently inserted, then upon application of either party the Agreement shall forthwith be physically amended to make such insertion or correction.

12. The complete contract as set forth in Paragraph 1 of this Agreement constitutes the entire Agreement of the parties. No other agreements, oral or written, pertaining to the work to be performed, exists between the parties. This Agreement can be modified only by an amendment in writing, signed by both parties and pursuant to action of the Governing Board of the District.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed.

DISTRICT

CONTRACTOR

By: \_\_\_\_\_  
Signature

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_

\_\_\_\_\_  
Title

\_\_\_\_\_  
Contractor's License No.

\_\_\_\_\_  
Tax ID/Social Security No.

(CORPORATE SEAL OF  
CONTRACTOR, if corporation)

END OF DOCUMENT 00 52 13

**DOCUMENT 00 61 13.13**

**FAITHFUL PERFORMANCE BOND**

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the IMPERIAL COMMUNITY COLLEGE DISTRICT of IMPERIAL COUNTY, CALIFORNIA (hereinafter referred to as "DISTRICT"), awarded to \_\_\_\_\_ (hereinafter referred to as the "Contractor/Principal") the contract for the work described as follows:

**PROJECT: IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION**

WHEREAS, said Contractor/Principal is required under the terms of said contract to furnish a bond for the faithful performance of said contract which contract is incorporated herein by reference;

NOW, THEREFORE, we the undersigned Contractor, as Principal, and Surety are held and firmly bound to the DISTRICT in the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_) (this amount being not less than one hundred percent [100%] of the total amount payable by the DISTRICT under the terms of the contract awarded by the DISTRICT to the Contractor/Principal), lawful money of the United States of America, for payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bonded Contractor/Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by and well and truly keep and perform all the undertakings, terms, covenants, conditions, and agreements in the said contract and any alteration thereof, made as therein provided, including, but not limited to, the provisions regarding contract duration and liquidated damages, all within the time and in the manner therein designated in all respects according to their true intent and meaning, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the contract, the above obligation shall hold good for a period of TWO (2) years after the acceptance of the work by DISTRICT, during which time if Contractor/Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the DISTRICT from loss or damage made evident during the period of TWO (2) years from the date of completion of the work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligation of Surety hereunder shall continue so long as any obligation of Contractor remains.

Whenever Contractor/Principal shall be, and is declared by the DISTRICT to be, in default under the contract, the DISTRICT having performed the DISTRICT's obligations thereunder, the Surety shall promptly remedy the default, or shall promptly:

1. Complete the contract in accordance with its terms and conditions; or
2. Obtain a bid or bids for completing the contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the DISTRICT, and make available as work progresses sufficient funds to pay the cost of completion less the balance of the contract price, but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth above. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor/Principal by the DISTRICT under the contract and any modifications thereto, less the amount previously properly paid by the DISTRICT to the Contractor/Principal.

Surety expressly agrees that the DISTRICT may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

Surety shall not utilize Contractor/Principal in completing the contract nor shall Surety accept a bid from Contractor/Principal for completion of the work if the DISTRICT, when declaring the Contractor/Principal in default, notifies Surety of the DISTRICT's objection to Contractor's/Principal's further participation in the completion of the work.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the DISTRICT named herein or the successors or assigns of the DISTRICT. Any suit under this bond must be instituted within the applicable statute of limitations period.

FURTHER, the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alternation or modification of the Project documents, or of the work to be performed thereunder, shall in any way affect its obligations on this bond; and it does hereby waive notice of any change, extension of time, alteration or modification of the Project documents or of work to be performed thereunder.

Contractor/Principal and Surety agree that if the DISTRICT is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay DISTRICT's reasonable attorney's fees incurred, with or without suit, in addition to the above amount.

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

\_\_\_\_\_  
Contractor/Principal (Seal)

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name and Title

\_\_\_\_\_  
Surety

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name and Title

[SEAL AND NOTARIAL  
ACKNOWLEDGEMENT OF  
SURETY]

(Mailing Address and Telephone \_\_\_\_\_  
No. of Surety) \_\_\_\_\_  
\_\_\_\_\_

END OF DOCUMENT 00 61 13.13

**DOCUMENT 00 61 13.16**

**PAYMENT BOND**

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, IMPERIAL COMMUNITY COLLEGE DISTRICT of IMPERIAL COUNTY, CALIFORNIA ("hereinafter referred to as District"), has awarded to \_\_\_\_\_, hereinafter referred to as the "Contractor/Principal" a contract for the work described as follows:

**PROJECT: IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION**

WHEREAS, said Contractor/Principal is required by Division 3, Part IV, Title XV, Chapter 7 (commencing at Section 3247) of the California Civil Code to furnish a bond in connection with said contract;

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

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Contractor/Principal, his/her or its heirs, executors, administrators, successors, or assigns, or a subcontractor, shall fail to pay any person or persons named in Civil Code Section 3181 or fail to pay for any materials, or other supplies, used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code, with respect to work or labor thereon of any kind, or shall fail to deduct, withhold, and pay over to the Employment Development Department, any amounts required to be deducted, withheld, and paid over by Section 13020 of the Unemployment Insurance Code with respect to work and labor thereon of any kind, then said Surety will pay for the same, in or to an amount not exceeding the amount hereinabove set forth, and also will pay in case suit is brought upon this bond, such reasonable attorney's fees as shall be fixed by the court, awarded and taxed as provided in Division 3, Part IV, Title XV, Chapter 7 (commencing at Section 3247) of the California Civil Code.

This bond shall inure to the benefit of any of the persons named in Section 3181 of the California Civil Code, so as to give a right of action to such person or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety of this bond shall not be exonerated or released from the obligation of the bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement hereinabove described or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement hereinabove described, nor by any rescission or attempted rescission of the contract, agreement or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the DISTRICT and original contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Section 3110 and 3112 of the California Civil Code, and has not been paid the full amount of his/her or its claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned.

Any claims under this bond may be addressed to:

\_\_\_\_\_ (Name and address of Surety)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Name and address of agent or  
representative in California,  
if different from above)

(Telephone number of Surety,  
or agent or representative  
in California)

IN WITNESS WHEREOF, we have hereto set our hands and seals on this \_\_\_\_\_ day of  
\_\_\_\_\_, 20\_\_\_\_ .

\_\_\_\_\_  
Contractor/Principal (Seal)

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name and Title

\_\_\_\_\_  
Surety

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name and Title

SEAL AND NOTARIAL  
ACKNOWLEDGEMENT OF  
SURETY]

(Mailing Address and Telephone No. of Surety) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

END OF DOCUMENT 00 61 13.16



**DOCUMENT 00 62 91**

**DRUG FREE WORKPLACE CERTIFICATION**

This Drug-Free Workplace Certification form is part of the Contract made by and between the Imperial Community College District (hereinafter referred to as "District") and

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(hereinafter referred to as the "Contractor") for the Building 200, 300 & 800 Modernization project (hereinafter referred to as the "Project"). This form is required from all successful bidders pursuant to the Drug-Free Workplace Act of 1990 (Government Code Section 8350 et seq.) The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract or grant for procurement of any property or service from any State agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract or grant awarded by a State agency may be subject to suspension of payments or termination, and the contractor or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred.

Pursuant to Government Code Section 8355, every person or organization awarded a contract or grant from a State agency shall certify that it will provide a drug-free workplace by doing all of the following:

- A. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance is prohibited in their workplace and specifying actions which will be taken against employees for violations of the prohibition;
  - B. Establishing a drug-free awareness program to inform employees about all of the following:
    - 1. The dangers of drug abuse in the workplace;
    - 2. The person or organization's policy of maintaining a drug-free workplace;
    - 3. The availability of drug counseling, rehabilitation and employee-assistance programs; and
    - 4. The penalties that may be imposed upon employees for drug abuse violations.
  - C. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required by subdivision "A," and that, as a condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.
- I, the undersigned, agree to fulfill the terms and requirements of the Drug-Free Workplace Act as it now exists or may hereinafter be amended. Particularly, I shall abide by Government Code Section 8355 when performing the Contract for the Project by:
- D. Publishing a statement notifying employees concerning the prohibition of controlled substance at my workplace;
  - E. Establishing a drug-free awareness program; and
  - F. Requiring that each employee engaged in the performance of the contract be given a copy of the statement required by Section 8355(a) and agree to abide by the terms of that statement.

I also understand that if the District determines that I have either: (a) made a false certification herein; or (b) violated this certification by failing to carry out the requirements of Section 8355, the Contract awarded herein is subject to termination, suspension of payments, or both. I further understand that if I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of the Act.

I acknowledge that I am aware of the provisions of Government Code Section 8350 et seq., and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

Executed on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_ at

\_\_\_\_\_.

\_\_\_\_\_  
Name of Contractor (Print or Type)

By

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

Subscribed and sworn before me  
this \_\_\_\_ day of \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
Notary Public in and for  
the State of California  
My Commission Expires: \_\_\_\_\_

END OF DOCUMENT 00 62 91

**DOCUMENT 00 72 26**

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**DOCUMENT 00 72 26**

**GENERAL CONDITIONS**

**ARTICLE 1. DEFINITIONS**

- (a) Action of the Governing Board is a vote of a majority of the membership in a lawful meeting.
- (b) Addenda are the changes in plans specifications, drawings, and Project documents which have been authorized in writing by the DISTRICT or ARCHITECT, and which alter, explain, or clarify the Project documents prior to the bid deadline.
- (c) Approval means written authorization by ARCHITECT or DISTRICT for specific applications.
- (d) As shown, as indicated, as detailed refer to drawings accompanying the specification.
- (e) Project Documents includes collectively, to wit: Notice Calling for Bids, Instructions to Bidders, Bid Form, Bid Bond, Designation of Subcontractors, Information Required of Bidder, Non-collusion Affidavit, Workers' Compensation Certificate, Drug Free Workplace Certificate, Change Orders, Shop Drawing Transmittals, all prequalification forms submitted pursuant to Public Contract Code Section 20111.5, if any, Faithful Performance Bond, Payment Bond, Insurance Certificates, Guarantees, Contractor's Certificate Regarding Non-Asbestos Containing Materials, if any, General Conditions, Supplemental General Conditions, if any, Special Conditions, if any, Plans, Drawings, Specifications, the Agreement and all modifications, addenda, and amendments thereto.
- (f) Contractor or District are those mentioned as such in the Agreement. They are treated throughout the Project documents as if they are of singular number and neuter gender.
- (g) Locality in which the work is performed means the county in which the public work is done.
- (h) Project is the planned undertaking as provided for in the Project documents by DISTRICT and CONTRACTOR.
- (i) Provide shall include "provide complete in place," that is, "furnish and install."
- (j) Safety Orders are those issued by the Division of Industrial Safety and OSHA safety and health standards for construction.
- (k) 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.
- (l) Subcontractor, as used herein, includes those having a direct contractual relationship with CONTRACTOR and one who furnishes material worked to a special design according to plans, drawings, and specifications of this work, but does not include one who merely furnishes material not so worked.
- (m) Surety is the person, firm, or corporation that executes as surety the CONTRACTOR'S Bid Security, faithful performance bond and payment bond.
- (n) Work of the CONTRACTOR or subcontractor includes labor or materials (including, without limitation, equipment and appliances) or both, incorporated in, or to be incorporated in the construction covered by the complete contract.
- (o) Worker includes laborer, worker, or mechanic.

ARTICLE 2. STATUS OF CONTRACTOR

(a) CONTRACTOR is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it performs the services required of it by the terms of the Project documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the DISTRICT and CONTRACTOR or any of CONTRACTOR'S agents or employees. CONTRACTOR assumes exclusively the responsibility for the acts of its employees as they relate to the services to be provided during the course and scope of their employment. CONTRACTOR, its agents and employees shall not be entitled to any rights or privileges of DISTRICT employees and shall not be considered in any manner to be DISTRICT employees. DISTRICT shall be permitted to monitor the activities of the contractor to determine compliance with the terms of the Project documents.

(b) Contractors are required by law to be licensed and regulated by the Contractors' State License Board. Any CONTRACTOR not so licensed is subject to penalties under the law, and the contract will be considered void pursuant to Section 7028.7 of the Business and Professions Code. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, 3132 Bradshaw Road, PO Box 2600, Sacramento, CA 95826.

ARTICLE 3. CHANGE IN NAME AND NATURE OF CONTRACTOR'S LEGAL ENTITY

(a) Before CONTRACTOR makes any change in the name or legal nature of the CONTRACTOR'S entity, CONTRACTOR shall first notify the DISTRICT in writing and cooperate with DISTRICT in making such changes as the DISTRICT may request in the Project documents.

ARTICLE 4. CONTRACTOR'S SUPERVISION, PROSECUTION AND PROGRESS

(a) During progress of the work, CONTRACTOR shall keep on the work site a competent superintendent satisfactory to DISTRICT. Before commencing the work herein, CONTRACTOR shall give written notice to DISTRICT and ARCHITECT of the name, qualifications and experience of such superintendent. If Superintendent is found unsatisfactory by District, CONTRACTOR shall replace the Superintendent with one acceptable to the DISTRICT. Superintendent shall not be changed except with written consent of DISTRICT, unless a superintendent proves to be unsatisfactory to CONTRACTOR and ceases to be in its employ, in which case, CONTRACTOR shall notify DISTRICT and ARCHITECT in writing and replace said Superintendent with one acceptable to the DISTRICT. Superintendent shall represent CONTRACTOR and all directions given to Superintendent shall be as binding as if given to CONTRACTOR.

(b) CONTRACTOR shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills as may be necessary to perform the work in accordance with the Project documents. CONTRACTOR shall carefully study and compare all plans, drawings, specifications, and other instructions and shall at once report to ARCHITECT any error, inconsistency or omission which CONTRACTOR or its employees may discover. The CONTRACTOR represents itself to DISTRICT as a skilled, knowledgeable, and experienced CONTRACTOR. The CONTRACTOR shall carefully study and compare the Project documents with each other and shall at once report to the ARCHITECT any errors, inconsistencies, or omissions discovered. The CONTRACTOR shall be liable to the DISTRICT for damage resulting from errors, inconsistencies, or omissions in the Project documents that the CONTRACTOR recognized, and which CONTRACTOR knowingly failed to report and which a similarly skilled, knowledgeable, and experienced contractor would have discovered.

(c) The CONTRACTOR shall verify all indicated dimensions before ordering materials or equipment, or before performing work. The CONTRACTOR shall take field measurements, verify field conditions, and shall carefully compare such field measurements and conditions and other information known to the CONTRACTOR with the Project documents before commencing work. Errors, inconsistencies or omissions discovered shall be reported to the DISTRICT at once. Upon commencement of any item of work, the CONTRACTOR shall be responsible for dimensions related to such item of work and shall make any corrections necessary to make work properly fit at no

additional cost to DISTRICT. This responsibility for verification of dimensions is a non-delegable duty and may not be delegated to subcontractors or agents.

(d) Omissions from the plans, drawings or specifications, or the misdescription of details of work which are manifestly necessary to carry out the intent of the plans, drawings and specifications, or which are customarily performed, shall not relieve the CONTRACTOR from performing such omitted or misdescribed work, but they shall be performed as if fully and correctly set forth and described in the plans, drawings and specifications.

(e) The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The CONTRACTOR shall be responsible to see that the finished work complies accurately with the Project documents.

#### ARTICLE 5. SUBCONTRACTORS

(a) CONTRACTOR agrees to bind every subcontractor by terms of the Project documents as far as such terms are applicable to subcontractor's work. If CONTRACTOR shall subcontract any part of the work, CONTRACTOR shall be as fully responsible to DISTRICT for acts and omissions of any subcontractor and of persons either directly or indirectly employed by any subcontractor, as it is for acts and omissions of persons directly employed by CONTRACTOR. Nothing contained in Project documents shall create any contractual relation between any subcontractor and DISTRICT, nor shall the con-tract documents be construed to be for the benefit of any subcontractor.

(b) DISTRICT'S consent to any subcontractor shall not in any way relieve CONTRACTOR of any obligations under the Project documents and no such consent shall be deemed to waive any provision of any Project document.

(c) CONTRACTOR must submit with its bid, a Designation of Subcontractors pursuant to the Subletting and Subcontracting Fair Practices Act. If CONTRACTOR specifies more than one subcontractor for the same portion of work or fails to specify a subcontractor, and such portion of the work exceeds one-half of one percent of the total bid, CONTRACTOR agrees that it is fully qualified to perform and shall perform such work itself, unless CONTRACTOR provides for substitution or addition of subcontractors. Substitution or addition of subcontractors shall be permitted only as authorized under the Subletting and Subcontracting Fair Practices Act, California Public Contract Code Section 4100, et. seq.

(d) 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 Public Contract 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.

(e) A copy of each subcontract, if in writing, or, if not in writing, then a written statement signed by the Contractor giving the name of the subcontractor and the terms and conditions of such subcontract, shall be filed with the DISTRICT before the subcontractor begins work. Each subcontract shall contain a reference to the Agreement between the DISTRICT and the CONTRACTOR and the terms of that Agreement and all parts of the Project documents shall be made a part of such subcontract insofar as applicable to the work covered thereby. Each subcontract will provide for termination in accordance with Article 13 of these General Conditions. Each subcontract shall provide for its annulment by the CONTRACTOR at the order of the ARCHITECT if in the ARCHITECT'S opinion the subcontractor fails to comply with the requirements of the Project documents insofar as the same may be applicable to this work. Nothing herein contained shall relieve the CONTRACTOR of any liability or obligation hereunder.

#### ARTICLE 6. PROHIBITED INTERESTS

(a) No official of DISTRICT who is authorized in such capacity and on behalf of DISTRICT to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with construction of the Project, shall become directly or indirectly interested financially in this Project or in any part thereof. No officer,

employee, architect, attorney, engineer or inspector of or for DISTRICT who is authorized in such capacity and on behalf of DISTRICT to exercise any executive, supervisory or other similar functions in connection with construction of Project shall become directly or indirectly interested financially in this Project or in any part thereof. CONTRACTOR shall receive no compensation and shall repay DISTRICT for any compensation received by CONTRACTOR hereunder, should CONTRACTOR aid, abet or knowingly participate in violation of this Article 6.

#### ARTICLE 7. DISTRICT'S INSPECTOR

(a) One or more Inspector(s), including special inspectors, as required, will be employed by DISTRICT in accordance with requirements of Title 24 of the California Code of Regulations and will be assigned to the Project. Duties of an Inspector are specifically defined in Section 4-342 of Title 24.

(b) No work shall be performed by the CONTRACTOR solely upon the instructions or comments by the Inspector. The Inspector has no authority to interpret the Project documents or order extra work and any extra work performed without the written instruction of the DISTRICT shall be at CONTRACTOR'S sole cost and expense and there will be no delay damages incurred by DISTRICT for such work.

(c) No work shall be carried on except with the knowledge and under the inspection of said Inspector(s). He/she shall have free access to any or all parts of work at any time. CONTRACTOR shall furnish Inspector reasonable opportunities for obtaining such information as may be necessary to keep Inspector fully informed respecting progress and manner of work and character of materials. Inspection of work shall not relieve CONTRACTOR from any obligation to fulfill the Project documents. Inspector or ARCHITECT shall have authority to stop work whenever provisions of Project documents are not being complied with and such noncompliance is discovered. CONTRACTOR shall instruct its employees accordingly.

#### ARTICLE 8. ARCHITECT'S STATUS

(a) The ARCHITECT shall be the DISTRICT'S representative during construction and shall observe the progress and quality of the work on behalf of the DISTRICT. ARCHITECT shall have the authority to act on behalf of DISTRICT only to the extent expressly provided in the Project documents. ARCHITECT shall have authority to stop work whenever such stoppage may be necessary in ARCHITECT'S reasonable opinion to insure the proper execution of the Project documents.

(b) The ARCHITECT shall be, in the first instance, the judge of the performance of the work. ARCHITECT shall exercise authority under the Project documents to enforce CONTRACTOR'S faithful performance.

(c) The ARCHITECT shall have all authority and responsibility established by law, including Title 24 of the California Code of Regulations. The ARCHITECT has the authority to enforce compliance with the Project documents and the CONTRACTOR shall promptly comply with instructions from the ARCHITECT or an authorized representative of the ARCHITECT.

(d) On all questions related to the quantities, the acceptability of material, equipment or workmanship, the execution, progress or sequence of work, the interpretation of plans, specifications or drawings, and the acceptable performance of the Contractor pursuant to the decision of the ARCHITECT shall govern and shall be precedent to any payment unless otherwise ordered by the Governing Board. The progress and completion of the work shall not be impaired or delayed by virtue of any question or dispute arising out of or related to the foregoing matters and the instructions of the ARCHITECT relating thereto.

(e) General supervision and direction 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 other than to ensure that the quality of the finished work is in accordance with the Project documents.

#### ARTICLE 9. NOTICE OF TAXABLE POSSESSORY INTEREST



(a) The terms of the Agreement may result in the creation of a possessory interest. If such a possessory interest is vested in a private party to the Agreement, the private party may be subjected to the payment of property taxes levied on such interest.

#### ARTICLE 10. ASSIGNMENT OF ANTITRUST ACTIONS

(a) Public Contract Code Section 7103.5 provides:

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 awarding body (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. Section 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 tender's final payment to the contractor, without further acknowledgment by the parties.

CONTRACTOR, for itself and all subcontractors, agrees to assign to DISTRICT all rights, title, and interest in and to all such causes of action CONTRACTOR and all subcontractors may have under the Agreement. This assignment shall become effective at the time DISTRICT tender's final payment to the CONTRACTOR and CONTRACTOR shall require assignments from all subcontractors to comply herewith.

#### ARTICLE 11. OTHER CONTRACTS

(a) 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 its work with such other contractors.

(b) 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. CONTRACTOR will be held accountable for damages to DISTRICT for that work which it failed to inspect or should have inspected. CONTRACTOR'S failure to inspect and report shall constitute its acceptance of other contractor's work as fit and proper for reception of its work, except as to defects which may develop in other contractors' work after execution of CONTRACTOR'S work.

(c) To insure proper execution of its 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 Project documents.

(d) CONTRACTOR shall ascertain to its 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 the Project to the end that CONTRACTOR may perform this Agreement in the light of such other contracts, if any.

(e) 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 cease work temporarily and which contractor shall continue or whether work can be coordinated so that contractors may proceed simultaneously.

(f) 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.

#### ARTICLE 12. OCCUPANCY

(a) DISTRICT reserves the right to occupy buildings and/or portions of the site at any time before completion, and such occupancy shall not constitute final acceptance of any part of work covered by this Agreement, nor shall such occupancy extend the date specified for completion of the work. Beneficial occupancy of building(s) does not commence any warranty period nor shall it entitle CONTRACTOR to any additional compensation due to such occupancy.

#### ARTICLE 13. DISTRICT'S RIGHT TO TERMINATE AGREEMENT

(a) If the CONTRACTOR refuses or fails to complete 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 file a petition for relief as a debtor, or should relief be ordered against CONTRACTOR as a debtor under Title 11 of the United States Code, or if CONTRACTOR should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, or if it should refuse or should fail to supply enough properly skilled workers or proper materials to complete the work in the time specified, or if CONTRACTOR should fail to make prompt payment to subcontractors for materials or labor, or disregard laws or ordinances or instructions of DISTRICT, or if CONTRACTOR or its subcontractors should otherwise be guilty of a violation of any provision of this Agreement, then DISTRICT may, without prejudice to any other right or remedy, serve written notice upon CONTRACTOR and its surety of DISTRICT'S intention to terminate this Agreement, such notice to contain the reasons for such intention to terminate, and unless within ten (10) days after the service of such notice such condition shall cease or such violation shall cease and arrangements satisfactory to DISTRICT for the correction thereof be made, this Agreement 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 to DISTRICT'S satisfaction.

(b) In the event of any such termination, DISTRICT shall immediately serve written notice thereof upon surety and CONTRACTOR, and surety shall have the right to take over and perform this Agreement, provided, however, that if surety within seven (7) days after service upon it of said notice of termination does not give DISTRICT written notice of its intention to take over and perform this Agreement or does not commence performance thereof within fifteen (15) days after date of serving such notice of termination by DISTRICT on surety, DISTRICT may take over the work and prosecute same to completion Agreement or by any other method it may deem advisable for the account and at the expense of CONTRACTOR, and CONTRACTOR and its surety shall be liable to DISTRICT for any excess cost or other damages occasioned by the DISTRICT thereby. Time is of the essence in this Agreement. If the DISTRICT takes over the work as hereinabove provided, the DISTRICT may, without liability for so doing, take possession of and utilize in completing the work such materials, supplies, equipment and other property belonging to the CONTRACTOR as may be on the site of the work and necessary, therefore.

(c) If the expense of finishing the work, including compensation for additional architectural, managerial, and administrative services, shall exceed the unpaid balance of the Agreement, CONTRACTOR shall pay the difference to DISTRICT. Expense incurred by DISTRICT as herein provided, and damage incurred through CONTRACTOR'S default, shall be certified to DISTRICT by ARCHITECT. If unpaid balance under the Agreement shall exceed expense of finishing the work, including compensation for additional architectural, managerial, and administrative services, such excess shall be paid to CONTRACTOR.

(d) In the event that sufficient funds are not appropriated to complete the Project, or the DISTRICT determines that sufficient funds are not available to complete the Project, DISTRICT may terminate or suspend the completion of the Project at any time by giving written notice to the CONTRACTOR. In the event that the DISTRICT exercises this option, the DISTRICT shall pay for any and all work and materials completed or delivered onto the site, and the value of any and all work then in progress and orders actually placed which cannot be canceled up to the date of notice of termination. The value of work and materials paid for shall include a factor of 15% for the CONTRACTOR'S overhead and profit and there shall be no other costs or expenses paid to CONTRACTOR. All work, materials and orders paid for pursuant to this provision shall become the property of the DISTRICT. DISTRICT may, without cause, order CONTRACTOR in writing to suspend, delay or interrupt the Project in whole or in part for such period of time as DISTRICT may determine. Adjustment shall be made for increases in the cost of performance of the Agreement caused by suspense, delay or interruption.

(e) The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to the DISTRICT.

#### ARTICLE 14. BONDS

(a) Unless otherwise specified in Special Conditions, CONTRACTOR shall furnish a surety bond in an amount equal to one hundred percent (100%) of contract price as security for faithful performance of this Agreement and shall furnish a separate bond in an amount of one hundred percent (100%) of the contract price as security for payment to persons performing labor and furnishing materials in connection with this Project. Bonds shall be in the form set forth in these Project documents.

#### ARTICLE 15. SUBSTITUTION OF SECURITIES

(a) Pursuant to the requirements of Public Contract Code Section 22300, upon CONTRACTOR'S request, DISTRICT will make payment to CONTRACTOR of any earned retention funds withheld from payments under this Agreement if CONTRACTOR deposits with the DISTRICT or in escrow with a California or federally chartered bank acceptable to DISTRICT, securities eligible for the investment pursuant to Government Code Section 16430 or bank or savings and loan certificates of deposit, upon the following conditions:

(1) CONTRACTOR shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

(2) All expenses relating to the substitution of securities under said Section 22300 and under this Article 15, including, but not limited to DISTRICT'S overhead and administrative expenses, and expenses of escrow agent shall be the responsibility of the CONTRACTOR.

(3) If CONTRACTOR shall choose to enter into an escrow agreement, such agreement shall be satisfactory to DISTRICT, which agreement shall be in the form attached hereto as part of the Project documents and which shall allow for the conversion to cash to provide funds to meet defaults by the CONTRACTOR including, but not limited to, termination of the CONTRACTOR'S control over the work, stop notices filed pursuant to law, assessment of liquidated damages or amount to be kept or retained under the provisions of the Project documents.

(4) Securities, if any, shall be returned to CONTRACTOR only upon satisfactory completion of the Agreement.

(b) To minimize the expense caused by such substitution of securities, CONTRACTOR shall, prior to or at the time CONTRACTOR requests to substitute security, deposit sufficient security to cover the entire amount to be then withheld and to be withheld under the General Conditions of this Agreement. Should the value of such substituted security at any time fall below the amount for which it was substituted, or any other amount which the DISTRICT determines to withhold, CONTRACTOR shall immediately and at CONTRACTOR'S expense deposit additional security qualifying under said Section 22300 until the total security deposited is no less than equivalent to the amount subject to withholding under the Agreement.

(c) In the alternative, under Section 22300, CONTRACTOR, at its own expense, may request DISTRICT to make payment of earned retention funds directly to the escrow agent. Also, at the expense of CONTRACTOR, CONTRACTOR may direct investment of the payments into securities, and CONTRACTOR shall receive the interest earned on the investment upon the same conditions as shown in paragraph (a) for securities deposited by CONTRACTOR. Upon satisfactory completion of the Agreement, CONTRACTOR shall receive from the escrow agent all securities, interest and payments received by the escrow agent from DISTRICT, pursuant to the terms of Section 22300. CONTRACTOR shall pay to each subcontractor, not later than twenty (20) days after receipt of payment, the respective amount of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld from each subcontractor on the amount withheld to insure performance of the CONTRACTOR.

(d) If any provision of this Article 15 shall be found to be illegal or unenforceable, then, notwithstanding, this Article 15 shall remain in full force and effect, and such provision shall be deemed stricken.

#### ARTICLE 16. FIRE INSURANCE

(a) CONTRACTOR will procure at CONTRACTOR'S own expense and before commencement of any work under this Agreement, fire insurance on the Project with course of construction, without exclusions, vandalism, and malicious mischief clauses attached. Amount of fire insurance shall be sufficient to protect against loss or damage in full until work is accepted by DISTRICT. CONTRACTOR shall submit proof of insurance and shall provide endorsements on forms provided by the DISTRICT or on forms approved by the DISTRICT. Such endorsements shall be submitted concurrently with the Project documents.

#### ARTICLE 17. PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

(a) CONTRACTOR shall take out and maintain during the life of this Agreement such public liability and property damage insurance as shall protect CONTRACTOR and DISTRICT from all claims for personal injury, including accidental death, to any person (including, as to DISTRICT, injury or death to CONTRACTOR'S or subcontractor's employees), as well as from all claims for property damage arising from operations under this Agreement, in amounts as set forth in the Agreement.

(b) CONTRACTOR shall require its subcontractors, if any, to take out and maintain similar public liability and property damage insurance in like amounts.

(c) CONTRACTOR shall submit proof of insurance and shall provide endorsements on the forms provided by the DISTRICT or on forms approved by the DISTRICT. Such endorsements shall be submitted concurrently with the Project documents.

#### ARTICLE 18. WORKERS' COMPENSATION INSURANCE

(a) In accordance with the provisions of Section 3700 of the California Labor Code, the CONTRACTOR and every subcontractor shall be required to secure the payment of compensation to its employees.

(b) The CONTRACTOR shall provide, during the life of the Agreement, workers' compensation insurance for all of its employees engaged in work under this Agreement, on or at the site of the Project, and, in case any of its work is sublet, the CONTRACTOR shall require the subcontractor similarly to provide workers' compensation insurance for all the latter's employees. Any class of employee or employees not covered by a subcontractor's insurance shall be covered by the CONTRACTOR' insurance. In case any class of employees engaged in work under this Agreement, on or at the site of the Project, is not protected under the workers' 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 before subcontractor commences work. The CONTRACTOR shall file with the DISTRICT certificates of its insurance protecting workers and a 30-day notice shall be provided to DISTRICT before the cancellation or reduction of any policy of CONTRACTOR or subcontractor. CONTRACTOR shall submit proof of insurance and shall provide endorsements on the forms provided by the DISTRICT or on forms approved by the DISTRICT. Such endorsements shall be submitted concurrently with the Project documents.

#### ARTICLE 19. PROOF OF CARRIAGE OF INSURANCE

(a) CONTRACTOR shall not commence work, nor shall it allow any subcontractor to commence work under this Agreement until all required insurance certificates and endorsements have been obtained and delivered in duplicate to and approved by DISTRICT. Such insurance shall be with an insurance company with a minimum rating of "A-VIII", as rated by the current edition of Best's Key Rating Guide, published by A.M. Best Co., Oldwick, New Jersey 08858 and admitted or qualified to do business in California.

(b) Certificates and insurance policies shall include the following:

- (1) A clause stating:

"This policy shall not be canceled or reduced in required limits of liability or amount of insurance until notice has been mailed to DISTRICT stating date of cancellation or reduction. Date of cancellation or reduction may not be less than thirty (30) days after date of mailing notice."

(2) Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

(3) Statement that the DISTRICT is a named additional insured under the policy described and that such insurance policy shall be primary to any insurance or self-insurance maintained by the DISTRICT.

(c) In case of CONTRACTOR'S failure to provide insurance as required by the Agreement, 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 to become due to the CONTRACTOR under this Agreement.

#### ARTICLE 20. DRAWINGS AND SPECIFICATIONS

(a) Drawings and Specifications 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.

(b) Drawings and Specifications are intended to comply with all laws, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Project documents, said laws, ordinances, rules and regulations shall be considered as a part of the Agreement within the limits specified. The CONTRACTOR shall bear all expenses of correcting work done 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.

(c) Questions regarding interpretation of drawings and specifications shall be clarified by the ARCHITECT; provided, however, that in the event ARCHITECT determines that CONTRACTOR'S requests for clarification or interpretation are not justified or do not reflect adequate competent supervision or knowledge by the CONTRACTOR or his/her subcontractors, CONTRACTOR shall be required to pay ARCHITECT'S reasonable and customary fees in processing and responding to such requests. 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.

(d) Figured dimensions on drawings shall govern but work not dimensioned shall be as directed. Work not particularly shown or specified shall be the same as similar parts that are shown or specified. Large scale drawings shall take precedence over smaller scale drawings as to shape and details of construction. Specifications shall govern as to materials, workmanship, and installation procedures. Drawings and specifications are intended to be fully cooperative and to agree. If CONTRACTOR observes that drawings and specifications are in conflict, CONTRACTOR shall promptly notify the ARCHITECT in writing, and any necessary changes shall be adjusted as provided in the Article entitled "Changes and Extra Work;" provided, however, that the specification calling for the higher quality material or workmanship shall prevail without additional cost to DISTRICT.

(e) Materials or work described in words which so applied has a well known technical or trade meaning shall be deemed to refer to such recognized standards.

(f) It is not the intention of the Agreement 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 it will be required to complete the work so named with all its incidental and accessory items according to the best practices of the trade.

(g) The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor necessary to achieve full and complete functioning of the material and/or equipment as per best practices of the trade(s) involved, unless specifically noted otherwise.

#### ARTICLE 21. OWNERSHIP OF DRAWINGS

(a) All plans, drawings, designs, specifications, and other incidental architectural and engineering work or materials and other Project documents and copies thereof furnished by DISTRICT are DISTRICT'S property. They are not to be used in other work and are to be returned to DISTRICT on request at completion of work and may be used by DISTRICT as it may require, without any additional costs to DISTRICT.

#### ARTICLE 22. DETAIL DRAWINGS AND INSTRUCTIONS

(a) In case of ambiguity, conflict, or lack of information, ARCHITECT shall furnish additional instructions by means of drawings or otherwise, necessary for proper execution of work. All such drawings and instructions shall be consistent with Project documents, true developments thereof, and reasonably inferable therefrom. Such additional instructions shall be furnished with reasonable promptness, provided that CONTRACTOR informs the ARCHITECT of the relationship of the request to the critical path of construction.

(b) Work shall be executed in conformity therewith and CONTRACTOR shall do no work without proper drawings and instructions.

(c) The ARCHITECT will furnish necessary additional details to more fully explain the work, which details shall be considered as part of the Project documents.

(d) Should any details be more elaborate, in the opinion of the CONTRACTOR, than scale drawings and specifications warrant, CONTRACTOR shall give written notice thereof 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 it 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.

(e) 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 become fully involved 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.

(f) If it is found at any time, before or after completion of the work, 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 make a recommendation: (1) that all such improper work should be removed, remade and replaced, and all work disturbed by these changes be made good at the CONTRACTOR'S expense; or (2) that the DISTRICT deduct from any amount due CONTRACTOR, the sum of money equivalent to the difference in value between the work performed and that called for by the drawings and specifications. ARCHITECT shall determine such difference in value. The DISTRICT, at its option, may pursue either recommendation made by the ARCHITECT.

#### ARTICLE 23. SHOP DRAWINGS

(a) CONTRACTOR shall check and verify all field measurements and shall submit to ARCHITECT six (6) copies, checked and approved by CONTRACTOR, of all shop or setting list drawings, schedules, and materials list required for the work of various trades. ARCHITECT shall review such drawings, schedules and materials list only for conformance with design concept of Project and compliance with information given in Project documents and return as

approved or disapproved with guidance as to required corrections within thirty (30) calendar days. CONTRACTOR shall make any corrections required by ARCHITECT, file three (3) corrected copies with ARCHITECT, and furnish such other copies as may be needed for construction within ten (10) calendar days. ARCHITECT'S approval of such drawings, schedules, or materials list shall not relieve CONTRACTOR from responsibility for deviations unless CONTRACTOR has in writing called ARCHITECT'S attention to such deviations at time of submission and secured ARCHITECT'S written approval, nor shall it relieve CONTRACTOR from responsibility for errors in shop drawings or schedules.

(b) All submittals of shop drawings, catalog cuts, data sheets, schedules and material lists shall be complete and shall conform to contract drawings and specifications.

(c) The term "shop drawing" as used herein shall be understood to include, but not be limited to, detail design calculations, fabrication and installation drawings, lists, graphs and operating instructions.

(d) Shop drawings shall be submitted at a time sufficiently early to allow review of same by the Division of State Architect (DSA) if required, and the ARCHITECT, and to accommodate the rate of construction progress required under the Project documents. CONTRACTOR will be required to pay ARCHITECT'S reasonable and customary fees in order to expedite review of shop drawings which are not submitted in a timely fashion.

(e) All shop drawing submittals shall be accompanied by an accurately completed transmittal form using the format bound herein. Any shop drawing submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for re-submittal. The CONTRACTOR may authorize a material or equipment supplier to deal directly with the ARCHITECT with regard to shop drawings, however, ultimate responsibility for the accuracy and completeness of the information contained in the submittal shall remain with the CONTRACTOR.

(f) Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of shop drawings on various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. At its option, the CONTRACTOR or Supplier may obtain from the ARCHITECT quantities of the shop drawing transmittal form at reproduction cost.

(g) CONTRACTOR'S review and approval of shop drawings shall include the following stamp:

"The CONTRACTOR has reviewed and approved not only the field dimensions but the construction criteria and has also made written notation regarding any information in the shop drawings that does not conform to the Project documents. This shop drawing has been coordinated with all other shop drawings received to date by CONTRACTOR and this duty of coordination has not been delegated to subcontractors, material suppliers, the ARCHITECT, or the engineers on this project.

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Signature of CONTRACTOR"

(h) Within thirty (30) calendar days after receipt of shop drawings, the ARCHITECT will return one or more prints of each drawing to CONTRACTOR with his or her comments noted thereon. The CONTRACTOR shall make a complete and acceptable submittal to the ARCHITECT by the second submission of drawings. The DISTRICT shall withhold funds due the CONTRACTOR to cover additional costs of the ARCHITECT'S review beyond the second submission and any other costs incurred by DISTRICT.

(i) If prints of the shop drawing are returned to the CONTRACTOR marked "NO EXCEPTIONS TAKEN," formal revision of said drawing will not be required. If prints of the drawing are returned to the CONTRACTOR marked "MAKE CORRECTIONS NOTED," formal re-submittal of said drawings will not be required. If prints of the drawing are returned to the CONTRACTOR marked "REVISE AND RESUBMIT," the CONTRACTOR shall revise said drawing and shall resubmit six (6) copies of the revised drawing to the ARCHITECT.

If prints of the drawing are returned to the CONTRACTOR marked "REJECTED RESUBMIT," the CONTRACTOR shall resubmit six (6) new copies of the drawing to the ARCHITECT.

(j) Fabrication of an item shall not be commenced before the ARCHITECT has reviewed the pertinent shop drawings and returned copies to the CONTRACTOR marked with "NO EXCEPTIONS TAKEN," or "MAKE CORRECTIONS NOTED." Revisions indicated on shop drawings shall be considered as changes necessary to meet the requirements of the Project documents and shall not be taken as the basis of claims for extra work. The review of such drawings by the ARCHITECT will be limited to checking for general agreement with the Project documents and shall in no way relieve the CONTRACTOR of responsibility for errors or omissions contained therein, nor shall such review operate to waive or modify any provision contained in the Project documents. Fabricating dimensions, quantities of material, applicable code requirements, and other contract requirements shall be the CONTRACTOR'S responsibility.

(k) No work represented by required shop drawings shall be purchased or commenced until the applicable submittal has been approved. The work shall conform to the approved shop drawings and all other requirements of the Project documents. The CONTRACTOR shall not proceed with any related work which may be affected by the work covered under shop drawings until the applicable shop drawings have been approved, particularly where piping, machinery, and equipment and the required arrangements and clearances are involved.

(l) Except where the preparation of a shop drawing is dependent upon the approval of a prior shop drawing, all shop drawings pertaining to the same class or portion of the work shall be submitted simultaneously.

(m) Calculations of a structural nature must be approved by the Division of State Architect.

(n) THE CONTRACTOR SHALL HAVE NO CLAIM FOR DAMAGES OR EXTENSION OF TIME DUE TO ANY DELAY RESULTING FROM THE CONTRACTOR HAVING TO MAKE THE REQUIRED REVISIONS TO SHOP DRAWINGS UNLESS REVIEW BY THE ARCHITECT OF SAID DRAWINGS IS DELAYED BEYOND THE TIME PROVIDED HEREINBEFORE AND THE CONTRACTOR CAN ESTABLISH THAT THE ARCHITECT'S DELAY IN REVIEW ACTUALLY RESULTED IN A DELAY IN THE CONTRACTOR CONSTRUCTION SCHEDULE. CONTRACTOR SHALL NOT BE ENTITLED TO ANY CLAIM FOR DAMAGES RESULTING FROM DSA REVIEW EXTENDING BEYOND FIFTEEN (15) CALENDAR DAYS AFTER SUBMITTAL. HOWEVER, DISTRICT MAY CONSIDER AN EXTENSION OF TIME DUE TO ANY DELAY CAUSED BY DSA REVIEW.

#### ARTICLE 24. LAYOUT AND FIELD ENGINEERING

(a) All field engineering required for laying out of this work and establishing grades for earthwork operations shall be furnished by CONTRACTOR at its 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 25. SOILS INVESTIGATION REPORT

(a) When a soils investigation report has been obtained from test holes at the site, such report is available for the CONTRACTOR'S use in preparing its bid and work under this Agreement. Any information obtained from such report or any information given on drawings as to surface and subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only. CONTRACTOR is required to make a visual examination of site and must make whatever test CONTRACTOR deems appropriate to determine surface and subsurface soil conditions. If, during the course of work under this Agreement, CONTRACTOR encounters subsurface or latent conditions which differ materially from those indicated in the soil's investigation report, then CONTRACTOR shall notify the DISTRICT within five (5) working days of discovery of the condition.

**WARNING: DISTRICT DOES NOT WARRANT THE SOILS AT THE PROJECT SITE. SOILS INVESTIGATION REPORT IS PROVIDED FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR HAS CONDUCTED AN INDEPENDENT INVESTIGATION OF THE PROJECT SITE AND THE SOILS**



CONDITIONS OF THE SITE. DISTRICT DOES NOT WARRANT THE SOILS CONDITIONS OF THE SITE AND CONTRACTOR IS FULLY RESPONSIBLE TO ASCERTAIN SITE CONDITIONS FOR THE PURPOSES OF DETERMINING CONSTRUCTION MEANS AND METHODS PRIOR TO COMMENCING CONSTRUCTION.

(b) CONTRACTOR agrees that no claim against DISTRICT will be made by CONTRACTOR for damages and hereby waives any rights to damages arising out of such subsurface or latent conditions. Not Applicable.

#### ARTICLE 26. TESTS AND INSPECTIONS

(a) Tests and inspections will comply with California Code of Regulations Title 24, Section 4-335.

(b) If the Agreement, 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 the DISTRICT'S Inspector of the date fixed for such inspection. Required certificates of inspection shall be secured by CONTRACTOR. Observations by DISTRICT'S Inspector shall be promptly made, and where practicable, at source of supply. If any work should be covered up without approval or consent of DISTRICT'S Inspector, it must be uncovered for examination and satisfactorily reconstructed at CONTRACTOR'S expense in compliance with the Agreement. Costs of tests, inspections and any materials found to be not in compliance with the Agreement shall be paid for by CONTRACTOR. Other costs for test and inspection shall be paid by the DISTRICT.

#### ARTICLE 27. TRENCHES, EXCAVATION AND SOILS

(a) CONTRACTOR shall provide adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavations, which conform to applicable safety standards.

(b) CONTRACTOR, except in an emergency, shall contact the appropriate regional notification center at least two (2) working days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and carried out by the CONTRACTOR unless such an inquiry identification number has been assigned to the CONTRACTOR or any SUBCONTRACTOR of the CONTRACTOR and the District or the ARCHITECT has been given the identification number by the CONTRACTOR.

(c) Emergency shall be defined as a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. Emergency includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage (Government Code Section 4216).

(d) Subsurface installation means any underground pipeline, conduit, duct, wire, or other structure operated or maintained in or across a public street or public right of way (Government Code Section 4216).

(e) If this Agreement 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 to whomever DISTRICT designates a detailed plan showing the design or 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. If such plan varies from the Shoring System Standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer employed by the CONTRACTOR, and all costs therefore shall be included in the price named in the Agreement for completion of the work as set forth in the Project documents. 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 CAL-OSHA and a CAL-OSHA permit for such plan delivered to the DISTRICT. Labor Code Section 6500; Health and Safety Code Section 17922.5).

(f) If this Agreement involves the digging of trenches or excavations that extend deeper than four feet below the surface, the following shall apply:

(1) The CONTRACTOR shall promptly, and before the following conditions are disturbed, notify the DISTRICT, in writing, of any:

(i) 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.

(ii) Subsurface or latent physical conditions at the site different from those indicated.

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

(2) The DISTRICT shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the CONTRACTOR's cost of, or the time required for, performance of any part of the work shall issue a change order under the procedures described in the Project documents.

(3) In the event a dispute arises between the DISTRICT and the CONTRACTOR, whether the conditions materially differ or involve hazardous waste, or cause a decrease or increase in the CONTRACTOR's cost of, or time required for, performance of any part of the work, the CONTRACTOR shall not be excused from any scheduled completion date provided for by the Project documents, but shall proceed with all the work to be performed under the Project documents. The CONTRACTOR shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties. Public Contract Code section 7104.

#### ARTICLE 28. DOCUMENTS ON WORK

(a) CONTRACTOR shall keep on the job site at all times one legible copy of all Project documents, including addenda and change orders, and Titles 19 and 24 of the California Code of Regulations, and all approved drawings, plans, schedules and specifications. Said documents shall be kept in good order and available to ARCHITECT, ARCHITECT'S representatives, and all authorities having jurisdiction. CONTRACTOR shall be acquainted with and comply with the provisions of said regulations as they relate to this Project. (See particularly the duties of Contractor, 24 Cal. Code of Regulations Sec. 4-343.) CONTRACTOR shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17.

#### ARTICLE 29. STATE AUDIT

(a) Pursuant to and in accordance with the provisions of Government Code Section 8546.7, or any amendments thereto, all books, records and files of the DISTRICT, the CONTRACTOR, or any subcontractor connected with the performance of this Agreement involving the expenditure of public funds in excess of Ten Thousand Dollars (\$10,000.00), including, but not limited to, the costs of administration of the Agreement, shall be subject to the examination and audit of the State Auditor at the request of the DISTRICT or as part of any audit of the DISTRICT for a period of three (3) years after final payment is made under this Agreement .

#### ARTICLE 30. SUBSTITUTIONS

(a) CONTRACTOR shall follow all instructions and requirements set forth in Information for Bidders, Section 20 for compliance with this Article 30.

(b) Whenever in specifications any materials, process, service or equipment is indicated or specified by brand name, trade name, proprietary name or by name of manufacturer, such specification shall be deemed to be used for the purpose of facilitating description of material, process, service or equipment desired and shall be deemed to be followed by the words "or equal," and CONTRACTOR may, unless otherwise stated, offer any material, process, service, or equipment which shall be substantially equal or better in every respect to that so indicated or specified subject to DISTRICT or ARCHITECT approval.

(c) If material, process, service, or equipment offered by CONTRACTOR is not, in opinion of ARCHITECT, or DISTRICT, substantially equal or better in every respect to that specified, then CONTRACTOR shall furnish the material, process, service, or equipment specified. Burden of proof as to equality of any material, process, service, or equipment shall rest with CONTRACTOR. Provision authorizing submission of "or equal" substantiating data shall not in any way authorize an extension of time for performance of this Agreement nor shall DISTRICT or ARCHITECT authorize the submission of "or equal" substantiating data within thirty (30) days of the filing of the Notice of Completion on the Project.

(d) In the event CONTRACTOR furnishes material, process service, or equipment more expensive than that specified, difference in cost of such material, process, service, or equipment so furnished shall be borne by CONTRACTOR. Any engineering, design fees, or approval agencies' fees required to make adjustments in material or work of all trades directly or indirectly affected by the approved substituted items shall be borne entirely by CONTRACTOR. Any difference in cost between an approved substitution which is lower in cost than the originally specified item shall be refunded by CONTRACTOR to DISTRICT.

(e) Price, fitness and quality being equal with regard to supplies, the District may prefer supplies grown, manufactured, or produced in California and next prefer supplies partially manufactured grown, or produced in California provided the bids of said suppliers or the prices quoted by them do not exceed by more than 5% of the lowest bids/prices quoted by out of state suppliers, the major portion of the manufacture of the supplies is not done outside of California and the public good will be served thereby. Government Code section 4330-4334.

#### ARTICLE 31. SAMPLE

(a) CONTRACTOR shall furnish for approval, within thirty-five (35) calendar days following award 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 the work. ARCHITECT shall review such samples, as to conformance with design concept of work and for compliance with information given in Project documents and approve or disapprove same within ten (10) working days from receipt of same.

(b) Unless specified otherwise, sampling, preparation of samples and tests shall be in accordance with the latest standards of the American Society for Testing and Materials.

(c) Samples shall, upon demand of ARCHITECT or DISTRICT, be submitted for tests or examinations and considered before incorporation of same into the work. CONTRACTOR shall be solely responsible for delays due to samples not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples which are of value after testing will remain the property of the CONTRACTOR.

#### ARTICLE 32. PROGRESS SCHEDULE

(a) Within five (5) calendar days after being awarded the contract, CONTRACTOR shall submit a progress schedule for DISTRICT'S approval. The schedule shall indicate the beginning and completion dates of all phases of construction and shall use the "critical path method" (commonly called CPM) or equivalent scheduling methodology for the value reporting, planning and scheduling, of all work required under the Project documents. The schedule will separately identify those milestones or events that must be completed before other portions of the work can be accomplished.

(b) The scheduling is necessary for the DISTRICT'S adequate monitoring of the progress of the work and shall be prepared in accordance with the time frame described in Article 4 of the Agreement. The DISTRICT may disapprove such a schedule and require modification to it if, in the opinion of the ARCHITECT or DISTRICT, adherence to the progress schedule will cause the work not to be completed in accordance with the Agreement. CONTRACTOR shall adhere to any such modifications required by the DISTRICT.

(c) CONTRACTOR will exchange scheduling information with subcontractors and suppliers. CONTRACTOR will order work, equipment and materials with sufficient lead time to avoid interruption of the work.

(d) The CONTRACTOR shall submit to DISTRICT a monthly schedule to reflect the actual sequence of the work which shall be totally separate and apart from the original progress schedule.

(e) The CONTRACTOR shall also, if requested by the ARCHITECT or DISTRICT, provide revised schedules within ten (10) calendar days if, at any time, the ARCHITECT or DISTRICT, consider the completion date to be in jeopardy. The revised schedule shall be designed to show how the CONTRACTOR intends to accomplish the work to meet the original completion date. The form and method employed by the CONTRACTOR shall be the same as for the original progress schedule. The CONTRACTOR shall modify any portions of the schedule that become infeasible because of "activities behind schedule" or for any other valid reason. CONTRACTOR will provide documents and justification for any schedule changes. An activity that cannot be completed by its original completion date shall be deemed to be behind schedule.

(f) CONTRACTOR shall submit a revised schedule within ten (10) consecutive calendar days of CONTRACTOR'S request for any extension of time. Failure to submit such schedule will result in CONTRACTOR waiving his/her right to obtain any extension of time.

(g) IF CONTRACTOR SUBMITS A REVISED SCHEDULE SHOWING AN EARLIER COMPLETION DATE FOR THE PROJECT, DISTRICT'S ACCEPTANCE OF THIS REVISED SCHEDULE SHALL NOT ENTITLE CONTRACTOR TO ANY DELAY CLAIM OR DAMAGES DUE TO ANY SUCH REVISED SCHEDULE.

### ARTICLE 33. MATERIALS AND WORK

(a) Except as otherwise specifically stated in this Agreement, CONTRACTOR shall provide and pay for all materials, supplies, tools, equipment, labor transportation, superintendence, temporary constructions of every nature, and all other services and facilities of every nature whatsoever necessary to execute and complete the Project within specified time.

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

(c) Materials shall be furnished in ample quantities and at such times as to insure uninterrupted progress of work and shall be stored properly and protected as required.

(d) CONTRACTOR shall, after issuance of the Notice to Proceed by 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 that orders have been placed.

(e) DISTRICT reserves the right, 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 date specified in the Agreement, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by the CONTRACTOR.

(f) No materials, supplies, or equipment for work under this Agreement 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 it, to DISTRICT free from any claims, liens, or charges. CONTRACTOR further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by this Agreement shall have any right to lien upon premises or any improvement or appurtenance 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 the event of installation of any such metering device or equipment, CONTRACTOR shall advise DISTRICT as to owner thereof.

(g) Nothing contained in this Article 33, however, shall defeat or impair the rights 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 hand of DISTRICT, and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials or labor when no formal contract is entered into for such materials or labor.

(h) The title to new materials and/or equipment and attendant liability for its protection and safety, shall remain in the CONTRACTOR until incorporated in the work 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; and CONTRACTOR shall keep an accurate inventory of all said materials and/or equipment in a manner satisfactory to the DISTRICT or its authorized representative.

#### ARTICLE 34. INTEGRATION OF WORK

(a) CONTRACTOR shall do all cutting, fitting, patching, and preparation 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 or existing conditions showing upon, or reasonably implied by, the drawings and specifications, and shall follow all directions given by the Architect.

(b) All costs caused by defective or ill-timed work shall be borne by CONTRACTOR.

(c) CONTRACTOR shall not endanger any work by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor without the written consent of the ARCHITECT. CONTRACTOR shall be solely responsible for protecting existing work on adjacent properties and shall obtain all required permits for shoring and excavations near property lines.

(d) When modifying existing work or installing new work adjacent to existing work, CONTRACTOR shall match, as closely as conditions of site and materials will allow, the finishes, textures, and colors of the original work, refinishing existing work as required, at no additional cost to DISTRICT.

(e) CONTRACTOR is aware that this Project may be split into several phases. If the Project is split into phases, then CONTRACTOR has made allowances for any delays or damages which may arise from coordination with contractors for other phases. If any delays should arise from a contractor working on a different phase, CONTRACTOR'S sole remedy for damages, including delay damages, shall be against the contractor who caused such damage and not the DISTRICT. CONTRACTOR shall provide access to contractors for other phases as necessary to prevent delays and damages to contractors working on other phases of construction.

#### ARTICLE 35. OBTAINING PERMITS, LICENSES AND EASEMENTS

(a) Permits, licenses, and certificates necessary for prosecution of work, shall be secured and paid for by CONTRACTOR, unless otherwise specified. All such permits, licenses, and certificates shall be delivered to the ARCHITECT before demand is made for the certificate of final payment. CONTRACTOR shall, and shall require subcontractors to, maintain contractor's licenses in effect as required by law.

(b) Easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by DISTRICT, unless otherwise specified.

(c) Permits and charges for installation, and inspection thereof, of utility services by serving utilities shall be secured and paid for by DISTRICT.

#### ARTICLE 36. SURVEYS

(a) Surveys to determine location 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 37. EXISTING UTILITY LINES; REMOVAL, RESTORATION

(a) 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 Agreement 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. If the CONTRACTOR, while performing work under this Agreement, discovers utility facilities not identified by the DISTRICT in the plans or specifications, CONTRACTOR shall immediately notify the DISTRICT and the utility in writing. CONTRACTOR shall be compensated according to the provisions governing changes in the work.

(b) 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 construction site can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the site of the construction.

(c) As part of the work to be performed, CONTRACTOR shall provide the notices and proceed in accordance with Government Code Sections 4216.2, 4216.3 and 4216.4, and pay all fees charged pursuant to Government Code Section 4216, et seq.

#### ARTICLE 38. WORK TO COMPLY WITH APPLICABLE LAWS AND REGULATIONS

(a) CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to the work as indicated and specified.

(b) If CONTRACTOR observes that plans, drawings or specifications are at variance therewith, CONTRACTOR shall promptly notify ARCHITECT in writing and any changes deemed necessary by the ARCHITECT shall be adjusted as provided for changes in work. If CONTRACTOR performs any work which it knew, or through exercise of reasonable care should have known, to be contrary to such laws, ordinances, rules or regulations, and without such notice to ARCHITECT, CONTRACTOR shall bear all costs arising therefrom. Where plans, drawings or specifications state that materials, processes, or procedures must be approved by the Division of State Architect, State Fire Marshall, or other body or agency, CONTRACTOR shall be responsible for satisfying requirements of such bodies or agencies.

#### ARTICLE 39. ACCESS TO WORK

(a) DISTRICT and its representatives shall at all times have access to work wherever it is in preparation or progress. CONTRACTOR shall provide safe and proper facilities for such access so that DISTRICT'S representatives may perform their functions.

#### ARTICLE 40. PAYMENTS BY CONTRACTOR

(a) 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 percent (90%) 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 its subcontractors, not later than the 5th day following each payment to CONTRACTOR the respective amounts allowed CONTRACTOR on account of work performed by respective subcontractor to the extent of such subcontractor's interest therein.

#### ARTICLE 41. UTILITIES

(a) 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.

(b) If Contract is for addition to existing facility, CONTRACTOR may with written permission of DISTRICT, use DISTRICT'S existing utilities by making prearranged payments to DISTRICT for utilities used by CONTRACTOR for construction.

#### ARTICLE 42. SANITARY FACILITIES

(a) The CONTRACTOR shall provide sanitary temporary toilet facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The toilet facilities 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.

#### ARTICLE 43. CLEANING UP

(a) CONTRACTOR at all times shall keep work site free from debris such as waste, rubbish, and excess materials and equipment caused by this work. CONTRACTOR shall not leave debris under, in, or about the work site, but shall promptly remove same. Upon completion of work, CONTRACTOR 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. CONTRACTOR shall clean and polish all glass, plumbing fixtures, and finish hardware and similar finish surfaces and equipment and remove temporary fencing, barricades, planking, sanitary facilities and similar temporary facilities from site. If CONTRACTOR fails to clean up, the DISTRICT shall do so, and the cost thereof shall be charged to the CONTRACTOR.

#### ARTICLE 44. PATENTS, ROYALTIES, AND INDEMNITIES

(a) The CONTRACTOR shall hold and save the DISTRICT and its governing board, 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 Agreement, including its use by the DISTRICT, unless otherwise specifically provided in the Project documents, and unless such liability arises from the sole negligence, or active negligence, or willful misconduct of the DISTRICT.

#### ARTICLE 45. GUARANTEE

(a) CONTRACTOR warrants that the work (which includes any equipment furnished by CONTRACTOR as part of the materials) shall: (a) Be free from defects in workmanship and material; (b) Be free from defects in any design performed by CONTRACTOR; (c) Be new, and conform and perform to the requirements stated

in the specifications and where detail requirements are not so stated, shall conform to applicable industry standards; and  
(d) Be suitable for the use stated in the specifications.

(b) The warranty period for discovery of defective work shall commence on the date stamped on the Notice of Completion verifying County recordation and continue for the period set forth in the specifications or for one year if not so specified. If, during the warranty period, the work is not available for use due to defective work, such time of unavailability shall not be counted as part of the warranty period. The warranty period for corrected defective work shall continue for a duration equivalent to the original warranty period.

(c) District shall give CONTRACTOR prompt written notice after discovery of any defective work. CONTRACTOR shall correct any such defective work, as well as any damage to any other part of the work resulting from such defective work, and provide repair, replacement, or reimbursement, at its sole expense, in a manner approved by the DISTRICT and with due diligence and dispatch as required to make the work ready for use by DISTRICT, ordinary wear and tear, unusual abuse or neglect excepted. Such corrections shall include, but not be limited to, any necessary adjustments, modifications, changes of design (unless of DISTRICT'S design), removal, repair, replacement or reinstallation, and shall include all necessary parts, materials, tools, equipment, transportation charges and labor as may be necessary, and cost of removal and replacement of work shall be performed at a time and in such a manner so as to minimize the disruption to DISTRICT'S use of the work.

(d) In the event of failure of CONTRACTOR or Surety to commence and pursue with diligence said repairs or replacements within ten (10) calendar days after being notified in writing, DISTRICT is hereby authorized to proceed to have defects repaired or replaced and made good at expense of CONTRACTOR and Surety who hereby agree to pay costs and charges therefore immediately on demand.

(e) 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 written notice required by this Article. If the CONTRACTOR or Surety cannot be contacted or neither complies 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 and Surety. Such action by the DISTRICT will not relieve the CONTRACTOR and Surety of the guarantees provided in this Article or elsewhere in the Project documents.

(f) This Article does not in any way limit the guarantees 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 to DISTRICT all appropriate guarantee or warranty certificates upon completion of the Project or upon request by DISTRICT.

(g) All guarantees required under this Article shall be in writing on the Guarantee form included in the Project documents.

(h) CONTRACTOR shall provide to DISTRICT instruction manuals for all items which require same.

(i) Nothing herein shall limit any other rights or remedies available to DISTRICT.

(j) The DISTRICT may collect its reasonable costs and attorneys' fees in any action to enforce this Article.

#### ARTICLE 46. DUTY TO PROVIDE FIT WORKERS

(a) CONTRACTOR and subcontractors shall at all times enforce strict discipline and good order among their employees and shall not employ on work any unfit person or anyone not skilled in work assigned to such person. It shall be the responsibility of CONTRACTOR to ensure compliance with this Article.



(b) Any person in the employ of the CONTRACTOR or subcontractors whom DISTRICT or ARCHITECT may deem incompetent, unfit, troublesome or otherwise undesirable shall be excluded from the work site and shall not again be employed on it except with written consent of DISTRICT.

ARTICLE 47. WAGE RATES, TRAVEL AND SUBSISTENCE

(a) Pursuant to the provisions of Article 2 (commencing at Section 1770), Chapter 1, Part 7, Division 2 of the Labor Code, the governing board of DISTRICT has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification or type of worker needed for this Project from the Director of the Department of Industrial Relations ("Director.") These rates are on file with the Clerk of the DISTRICT'S governing board and copies will be made available to any interested party on request. CONTRACTOR shall post a copy of such wage rates at the work site.

(b) 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. Holidays shall be defined in the Collective Bargaining Agreement applicable to each particular craft, classification or type of worker employed.

(c) CONTRACTOR shall pay and shall cause to be paid each worker engaged in work on the Project not less than the general prevailing rate of per diem wages determined by the Director, regardless of any contractual relationship which may be alleged to exist between the CONTRACTOR or any subcontractor and such workers.

(d) CONTRACTOR shall pay and shall cause to be paid to each worker needed to execute the work on the Project travel and subsistence payments, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed with the Department of Industrial Relations in accordance with Labor Code Section 1773.8.

(e) 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 this public work is to be performed, such change shall not alter the wage rates in the Notice Calling for Bids or the contract subsequently awarded.

(f) Pursuant to Labor Code Section 1775, CONTRACTOR shall as a penalty to the DISTRICT, forfeit fifty dollars (\$50) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of per diem wages, determined by the Director, for such craft or classification in which such worker is employed for any public work done under the Agreement by CONTRACTOR or by any subcontractor under it. The amount of the penalty shall be determined by the Labor Commission and shall be based on consideration of the CONTRACTOR'S mistake, inadvertence or neglect in failing to pay the correct prevailing rate of per diem wage, or the previous record of the CONTRACTOR in meeting his or her prevailing rate of per diem wage obligations, or the CONTRACTOR'S willful failure to pay the correct prevailing rate of per diem wages. A mistake, inadvertence or neglect in failing to pay the correct prevailing rate of per diem wage is not excusable if the CONTRACTOR had knowledge of his or her obligations under this part. The difference between such prevailing rate of per diem wage and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing rate of per diem wage shall be paid to each worker by the CONTRACTOR.

(g) Any worker employed to perform work on the Project, which work is not covered by any craft or classification listed in the general prevailing rate of per diem wages determined by the Director shall be paid not less than the minimum rate of wages specified therein for the craft or classification which most nearly corresponds to work to be performed by them, and such minimum wage rate shall be retroactive to time of initial employment of such person in such craft or classification.

(h) Pursuant to Labor Code Section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, and subsistence pay as provided for in Labor Code Section 1773.8.

(i) CONTRACTOR shall post at appropriate conspicuous points on the site of the Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned.

#### ARTICLE 48. HOURS OF WORK

(a) 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 Agreement upon the work or upon any part of the work contemplated by this Agreement shall be limited and restricted by the Agreement to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, work performed by employees of CONTRACTOR in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for 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.

(b) The CONTRACTOR shall keep and shall cause each subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by CONTRACTOR in connection with the work or any part of the work contemplated by this Agreement. The record shall be kept open at all reasonable hours to the inspection of the DISTRICT and to the Division of Labor Standards Enforcement, Department of Industrial Relations.

(c) Pursuant to Labor Code Section 1813, the CONTRACTOR shall pay to the DISTRICT a penalty of Twenty-Five Dollars (\$25) for each worker employed in the execution of this Contract by the CONTRACTOR or by any subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and 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.

(c) Any work necessary to be performed after regular working hours or on Sundays or other holidays shall be performed without additional expense to DISTRICT.

#### ARTICLE 49. PAYROLL RECORDS

(a) Pursuant to the provisions of Labor Code Section 1776, the CONTRACTOR shall keep and shall cause each subcontractor performing any portion of the work under this Agreement to 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 CONTRACTOR in connection with the work.

(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the CONTRACTOR on the following basis:

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

(2) A certified copy of all payroll records enumerated in subdivision (a) 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.

(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection upon request by the public or copies thereof made; provided, however, that a request by the public shall be made either through 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 (2), 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 the records at the principal office of the CONTRACTOR.

(4) The form of certification shall be as follows:

I, \_\_\_\_\_ (Name-print), the undersigned, am \_\_\_\_\_ (position in business) with the authority to act for and on behalf of \_\_\_\_\_ (Name of business and/or CONTRACTOR), certify under penalty of perjury that the records or copies thereof submitted and consisting of \_\_\_\_\_ (description, number of pages) are the originals or true, full and correct copies of the originals which depict the payroll record(s) of the actual disbursements by way of cash, check, or whatever form to the individual or individuals named.

Dated: \_\_\_\_\_ Signature: \_\_\_\_\_

(c) Contractor shall file a certified copy of the payroll records enumerated in subdivision (a) with the entity that requested the records within ten (10) days after receipt of a written request. In the event that the CONTRACTOR fails to comply within the 10-day period, the CONTRACTOR shall, as a penalty to the DISTRICT, forfeit Twenty-Five Dollars (\$25) 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, these penalties shall be withheld from progress payments then due.

(d) Any copy of payroll records made available for inspection as copies and furnished upon request to the public 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 shall not be marked or obliterated.

(e) The CONTRACTOR shall inform the DISTRICT of the location of the payroll records enumerated under subdivision (a), including the street address, city and county, and shall, within five (5) working days, provide a written notice of a change of location and address.

(f) It shall be the responsibility of the CONTRACTOR to ensure compliance with the provisions of this Article 50 and the provisions of Labor Code Section 1776.

#### ARTICLE 50. APPRENTICES

(a) The CONTRACTOR acknowledges and agrees that, if this Agreement involves a dollar amount greater than or a number of working days greater than that specified in Labor Code Section 1777.5, this Agreement is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of the CONTRACTOR to ensure compliance with this Article 51 and with Labor Code Section 1777.5 for all apprenticing occupations.

(b) Apprentices of any crafts or trades may be employed and, when required by Labor Code Section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

(c) Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he or she is employed and shall be employed only at the work of the craft or trade to which he or she is registered.

(d) Only apprentices, as defined in Section 3077, who are in training under apprenticeship standards and written apprentice agreements under Chapter 4 (commencing at Section 3070), Division 3 of the Labor Code, are eligible to be employed on public works. The employment and training of each apprenticeship shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he or she is training.

(e) Pursuant to Labor Code Section 1777.5, the CONTRACTOR and any subcontractors employing workers in any apprenticeship craft or trade in performing any work under this Agreement shall apply to the applicable joint apprenticeship committee for a certificate approving the CONTRACTOR or subcontractor under the applicable apprenticeship standards for the employment and training of apprentices.

(f) 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 Agreement, the number of apprentices to be employed and the approximate dates the apprentices will be employed.

(g) If the CONTRACTOR or subcontractor willfully fails to comply with Labor Code Section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

(1) be denied the right to bid on any subsequent project for one year from the date of such determination; and

(2) forfeit as a penalty to the DISTRICT fifty dollars (\$50) per day for each calendar day of noncompliance, which shall be withheld from any payment due or to become due under the terms of this Agreement. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council.

(h) The CONTRACTOR and all subcontractors shall comply with Labor Code Section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

(i) CONTRACTOR shall become fully acquainted with the law regarding apprentices prior to commencement of the work. Special attention is directed to Sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and Title 8, California Code of Regulations, Section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, California.

#### ARTICLE 51. LABOR - FIRST AID

(a) The CONTRACTOR shall maintain emergency first aid treatment for CONTRACTOR'S workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C.A., Sec. 651 et seq.).

#### ARTICLE 52. PROTECTION OF PERSONS AND PROPERTY

(a) The CONTRACTOR shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Agreement and shall take all necessary measures and be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance by the DISTRICT. 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. All work shall be solely at the CONTRACTOR'S risk with the exception of damage to the work caused by "acts of God" as defined in Public Contract Code Section 7105.

(b) CONTRACTOR shall take, and require subcontractors to take, all necessary precautions for safety of workers and shall comply with all applicable federal, state, local and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to the work site and to provide a safe and healthful place of employment. CONTRACTOR shall furnish, erect and properly maintain at all times, as directed by DISTRICT or ARCHITECT or required by conditions and progress of work, all necessary safety devices, safeguards, construction canopies, signs audible devices for protection of the blind, safety rails, belts and nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction. CONTRACTOR shall designate a responsible employee, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety and health of workers. Name and position of person so designated shall be reported in writing to DISTRICT by CONTRACTOR. CONTRACTOR shall correct any violations of safety laws, standards, orders, rules, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, such violation shall be corrected immediately by the CONTRACTOR at CONTRACTOR'S expense.

(c) In an emergency affecting safety of person or of work or of adjoining property, CONTRACTOR, without special instruction or authorization from ARCHITECT or DISTRICT, is hereby permitted to act, at its discretion, to prevent such threatened loss or injury; and CONTRACTOR shall so act if so authorized or instructed by Architect or DISTRICT. Any compensation claimed by CONTRACTOR on account of emergency work shall be determined by written agreement with the DISTRICT.

(d) CONTRACTOR shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

(e) CONTRACTOR shall (unless waived by the DISTRICT in writing):

(1) When performing new construction on existing sites, become informed and take into specific account the maturity of the students on the site; and perform work which may interfere with school routine before or after school hours; enclose working area with a substantial barricade; and arrange work to cause a minimum amount of inconvenience and danger to students and faculty in their regular school activities.

(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) When directed by DISTRICT, take preventive measures to eliminate objectionable dust.

(5) Enforce all instructions of DISTRICT and ARCHITECT regarding signs, advertising, fires, and smoking and require that all workers 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.

#### ARTICLE 53. NON-DISCRIMINATION

(a) In the performance of the terms of this Agreement, CONTRACTOR agrees that it will not engage in nor permit such subcontractor as it may employ to engage in unlawful discrimination in employment of persons because of the race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons.

#### ARTICLE 54. COSTS BREAKDOWN AND PERIODICAL ESTIMATES

(a) CONTRACTOR shall furnish on form approved by DISTRICT:

(1) Within ten (10) calendar days of award of contract a detailed estimate giving complete breakdown of contract price for each project or site which shall include all subcontractor/supplier agreements showing dollar amounts of these agreements to justify the schedule of values; and

(2) A periodical itemized estimate of work done for purpose of making partial payments thereon.

(3) Within ten (10) calendar days of request of DISTRICT, a schedule of estimated monthly payments which shall be due CONTRACTOR under the Agreement.

(b) Values employed in making up any of these schedules are subject to the ARCHITECT'S written approval and will be used only for determining basis of partial payments and will not be considered as fixing a basis for additions to or deductions from contract price.

ARTICLE 55. CONTRACTOR CLAIMS

(a) If the CONTRACTOR shall claim compensation for any damage sustained by reason of the acts of the DISTRICT or its agents, CONTRACTOR shall, within five (5) calendar days after sustaining of such damage, make to the ARCHITECT a written statement of the damage sustained. On or before the 15th day of the month succeeding that in which such damage shall have been sustained the CONTRACTOR shall file with the DISTRICT an itemized statement of the details and amount of such damage, and unless such statement shall be made as thus required, CONTRACTOR'S claims for compensation shall be forfeited and invalidated and it shall not be entitled to consideration for payment on account of any such damage.

ARTICLE 56. DISPUTES - ARCHITECT'S DECISIONS

(a) The ARCHITECT shall within a reasonable time, make decisions on all claims of the DISTRICT or CONTRACTOR and on all other matters relating to the execution and progress of the work. The decisions of the ARCHITECT shall not be binding but shall be advisory only.

(b) Except for tort claims, all claims by the CONTRACTOR for a time extension, payment of money or damages arising from work done by, or on behalf of, the CONTRACTOR pursuant to the Agreement and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or as to the amount of payment which is disputed by the DISTRICT of Three Hundred Seventy Five Thousand Dollars (\$375,000) or less shall be subject to the settlement and arbitration provisions procedures set forth in Public Contract Code Section 20104, et seq. Those sections require that the claim be in writing, include the documents necessary to substantiate the claim, and be filed on or before the final date of payment, subject to all time limits and notice requirements for filing claims under this Agreement.

(i) For claims less than Fifty Thousand Dollars (\$50,000) the DISTRICT shall respond in writing within 45 days of receipt of the claim or may request in writing within 30 days additional documentation which, if required, shall be provided upon mutual agreement of the DISTRICT and the CONTRACTOR. The DISTRICT'S written response to the claim shall be within 15 days after receipt of the further documentation or within a time period equivalent to that taken by the CONTRACTOR to provide the additional documentation, whichever is greater.

(ii) For claims over Fifty Thousand Dollars (\$50,000) and less than or equal to Three Hundred Seventy-Five Thousand Dollars (\$375,000), the DISTRICT shall respond in writing within 60 days of receipt of the claim or may request in writing within 30 days any additional documentation. If such additional documentation is required, it shall be provided upon mutual agreement of the DISTRICT and the CONTRACTOR. The DISTRICT'S written response to the claim shall be submitted to the CONTRACTOR within 30 days after receipt of further documentation or within a period of time no greater than that taken by the CONTRACTOR in producing the additional documentation, whichever is greater.

If the CONTRACTOR disputes the DISTRICT'S written response or the DISTRICT fails to respond within a timely fashion, the CONTRACTOR within 15 days after the response or failure to respond may demand in writing an informal conference to meet and confer for settlement of the issues in dispute, which conference shall be scheduled within 30 days for settlement of the dispute.

If the claim or any portion of the claim remains in dispute, the CONTRACTOR 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 CONTRACTOR submits his or her written claim until the time that the claim is denied as a result of the meet and confer process. Further, should legal action be pursued, the provisions relating to mediation and arbitration contained in Public Contract Code section 20104.4 shall be followed.

(c) In the event of a dispute between the parties as to performance of the work, the interpretation of this Agreement or payment or nonpayment for work performed or not performed, the parties shall attempt to resolve the

dispute. Pending resolution of the dispute, CONTRACTOR agrees to continue the work diligently to completion. If the dispute is not resolved, CONTRACTOR agrees it will neither rescind the Agreement nor stop the progress of the work, but CONTRACTOR'S sole remedy shall be to submit such controversy to determination by a court of the State of California, in Orange County, having competent jurisdiction of the dispute, after the Project has been completed, and not before.

#### ARTICLE 57. PAYMENTS

(a) Unless otherwise specified in writing, each month within thirty (30) days after receipt by the DISTRICT of the monthly progress schedule and the certification of application for payment by the Architect, there shall be paid to CONTRACTOR a sum equal to ninety five percent (95%) of value of work performed and of materials delivered subject to or under the control of the DISTRICT and unused up to the last day of the previous month, less aggregate previous payments. 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 operate to release CONTRACTOR or Surety from any damages arising from such work or from enforcing each and every provision of this Agreement, and DISTRICT shall have the right subsequently to correct any error made in any estimate for payment. CONTRACTOR SHALL NOT BE ENTITLED TO HAVE ANY PAYMENT ESTIMATES PROCESSED OR BE ENTITLED TO HAVE ANY PAYMENT 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 BY THE CONTRACTOR.

(b) DISTRICT has discretion to require from the CONTRACTOR any of the following information with the application for payment: (i) certified payroll covering the period of the prior application for payment; (ii) unconditional waivers and releases from all subcontractors/suppliers for which payment was requested under the prior application for payment; (iii) receipts or bills of sale for any items.

(c) Before 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 in accordance with the terms of the Project documents and that the amount stated in the certificate is due under the terms of the Project documents, which certificate shall be attached to and made a part of the claim made and filed with the DISTRICT, provided that if the ARCHITECT shall, within three (3) days after written demand therefore, fail to deliver such certificate to the DISTRICT, the CONTRACTOR may file its claim with the DISTRICT without said certificate, but together with such claim shall be filed a statement that demand was made for such certificate and that the same was refused. Thereupon, the DISTRICT will either allow said claim as presented or shall, by an order entered on the minutes of said DISTRICT state the reasons for refusing to allow said claim. It is understood, moreover, that the certificate of the ARCHITECT shall not be conclusive upon the DISTRICT, but advisory only.

(d) NO PAYMENT BY DISTRICT HEREUNDER SHALL BE INTERPRETED SO AS TO IMPLY THAT DISTRICT HAS INSPECTED, APPROVED, OR ACCEPTED ANY PART OF THE WORK. The final payment of five percent (5%) of the value of the work done under this Agreement, if unencumbered, shall be made thirty-five (35) days after recording by the DISTRICT of the Notice of Completion. ACCEPTANCE WILL BE MADE ONLY BY ACTION OF THE GOVERNING BOARD OF DISTRICT.

(e) Unless otherwise provided, on or before making request for final payment of the undisputed amount due under the Agreement, CONTRACTOR shall submit to DISTRICT, in writing a summary of all claims for compensation under or arising out of this Agreement which were timely filed. The acceptance by CONTRACTOR of the payment of the final amount shall constitute a waiver of all claims against DISTRICT under or arising out of this Agreement, except those previously made, in a timely manner and in writing, and identified by CONTRACTOR as unsettled at the time of CONTRACTOR'S final request for payment.

#### ARTICLE 58. CHANGES AND EXTRA WORK

(a) DISTRICT may, as provided by law and without affecting the validity of this Agreement, order changes, modifications, deletions and extra work by issuance of written change orders from time to time during the

progress of the Project, contract sum being adjusted accordingly. All such work shall be executed under conditions of the original Agreement except that any extension of time caused thereby shall be adjusted at time of ordering such change. DISTRICT has discretion to order changes on a "time and material" basis with adjustments to time made after CONTRACTOR has justified through documentation the impact on the critical path of the Project.

(b) Notwithstanding any other provision in the Project documents, the adjustment in the contract sum, if any, and the adjustment in the contract time, if any, set out in a change order shall constitute the entire compensation and/or adjustment in the contract time due CONTRACTOR arising out of the change in the work covered by the change order unless otherwise provided in the change order. The amount of the compensation due CONTRACTOR shall be calculated pursuant to subparagraph (e) of this Article 59. The entire compensation shall not include any additional charges not set forth in subparagraph (e) and shall not include delay damages (due to processing of a change order, refusal to sign a change order) indirect, consequential, and incidental costs including any project management costs, extended home office and field office overhead, administrative costs and profit other than those amounts authorized under subparagraph (e) of this Article 59.

(c) In giving instructions, ARCHITECT shall have authority to make minor changes in work, not involving change in cost, and not inconsistent with purposes of the Project. The DISTRICT'S Assistant Superintendent of Business Services may authorize changes in work involving a change in cost that does not exceed Fifteen Thousand Dollars \$15,000. Otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order from DISTRICT, authorized by action of the governing board, and no claim for addition to contract sum shall be valid unless so ordered.

(d) If the ARCHITECT determines that work required to be done constitutes extra work outside the scope of the Agreement, the ARCHITECT shall send a request for a detailed proposal to the CONTRACTOR. CONTRACTOR will respond with a detailed proposal within five (5) calendar days of receipt of the Request for Proposal. If the work is to be performed by a subcontractor, CONTRACTOR must include a bid from the subcontractor.

(e) Value of any such extra work, change, or deduction shall be determined at the discretion of DISTRICT in one or more of the following ways:

(1) By unit prices contained in CONTRACTOR'S original bid and incorporated in the Project documents or fixed by subsequent agreement between DISTRICT and CONTRACTOR.

(2) By cost of material and labor and percentage for overhead and profit ("time and material"). If the value is determined by this method the following requirements shall apply:

(A) Daily Reports by Contractor.

(i) General. At the close of each working day, the CONTRACTOR shall submit a daily report to the ARCHITECT and the Inspector, on forms approved by the DISTRICT, together with applicable delivery tickets, listing all labor, materials, and equipment involved for that day, and for other services and expenditures when authorized concerning extra work items. An attempt shall be made to reconcile the report daily, and it shall be signed by the ARCHITECT and the CONTRACTOR. In the event of disagreement, pertinent notes shall be entered by each party to explain points which cannot be resolved immediately. Each party shall retain a signed copy of the report. Reports by Subcontractors or others shall be submitted through the CONTRACTOR.

(ii) Labor. The report shall show names of workers, classifications, and hours worked and hourly rate. Project Superintendent expenses are not allowed.

(iii) Materials. The report shall describe, and list quantities of materials used and unit cost.

(iv) Equipment. The report shall show type of equipment, size, identification number, and hours of operation, including loading and transportation, if applicable, and hourly/daily cost.



(v) Other Services and Expenditures. Other services and expenditures shall be described in such detail as the DISTRICT may require.

(B) Basis for Establishing Costs

(i) Labor. The costs of labor will be the actual cost for wages prevailing locally for each craft classification or type of workers at the time the extra work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from federal, state or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. The use of labor classification which would increase the extra work cost will not be permitted unless the CONTRACTOR establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.

(ii) Materials. The cost of materials reported shall be at invoice or lowest current price at which such materials are locally available and delivered to the work site in the quantities involved, plus sales tax, freight and delivery. The DISTRICT reserves the right to approve materials and sources of supply, or to supply materials to the CONTRACTOR if necessary, for the progress of the work. No markup shall be applied to any material provided by the DISTRICT.

(iii) Tool and Equipment Rental. No payment will be made for the use of tools which have a replacement value of \$100 or less or where an invoice is not provided.

Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental source, or distributors, at the time the work is performed. The rental rates paid shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. Necessary loading and transportation costs for equipment used on the extra work shall be included.

If equipment is used intermittently and, when not in use, could be returned to its rental source at less expense to the DISTRICT than holding it at the work site, it shall be returned, unless the CONTRACTOR elects to keep it at the work site at no expense to the DISTRICT.

All equipment shall be acceptable to the ARCHITECT, in good working condition, and suitable for the purpose for which it is to be used. Manufacturer's ratings and manufacturer's approved modifications shall be used to classify equipment and it shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

(iv) Other Items. The DISTRICT may authorize other items which may be required on the extra work. Such items include labor, services, material and equipment which are different in their nature from those required by the work and which are of a type not ordinarily available from the CONTRACTOR or any of the subcontractors. Invoices covering all such items in detail shall be submitted with the request for payment.

(v) Invoices. Vendors' invoices for material, equipment rental, and other expenditures, shall be submitted with the request for payment. If the request for payment is not substantiated by invoices or other documentation, the DISTRICT may establish the cost of the item involved at the lowest price which was current at the time of the report.

(C) The following form shall be used as applicable by the DISTRICT and CONTRACTOR to communicate proposed additions and deductions to the Agreement.

	EXTRA	CREDIT
i. Material (attach itemized quantity and unit cost plus sales tax)	_____	_____
ii. Labor (attach itemized hours and rates)	_____	_____
iii. Subtotal	_____	_____
iv. If subcontractor performed work, add Subcontractor's overhead and profit to portions performed by it, not to exceed 15% of Item iii. above	_____	_____
v. Subtotal	_____	_____
vi. General Contractor's Overhead and Profit, not to exceed 15% of Item v if Contractor performed the work. If subcontractor performed the work, not to exceed 5% of Item v. Of portions performed by Contractor and subcontractors, portions performed by Contractor shall not exceed 15% of Item V, and portions performed by Subcontractor shall not exceed 5% of Item v.	_____	_____
vii. Subtotal	_____	_____
viii. Bond and Liability Insurance Premium, if in fact additional bonds or insurance were actually purchased, not to exceed 1% of Item vii.	_____	_____
ix. Total	_____	_____

(3) IT IS EXPRESSLY UNDERSTOOD THAT THE VALUE OF SUCH EXTRA WORK OR CHANGES, AS DETERMINED BY ANY OF THE AFOREMENTIONED METHODS, EXPRESSLY INCLUDES ANY AND ALL OF CONTRACTOR'S COSTS AND EXPENSES, BOTH DIRECT AND INDIRECT, RESULTING FROM ADDITIONAL TIME REQUIRED ON THE PROJECT, OR RESULTING FROM DELAYS TO THE PROJECT.

(f) 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 CONTRACTOR or to grant an extension of time, or constitutes a waiver of any provision in the Agreement, CONTRACTOR shall notify the DISTRICT, in writing, of such claim within five (5) calendar days from the date CONTRACTOR has actual or constructive notice of the factual basis supporting the claim. The notice shall state the factual bases for the claim and cite in detail the Project documents (including plans and specifications) upon which the claim is based. The CONTRACTOR'S failure to notify the DISTRICT within such five (5) day period shall be deemed a waiver and relinquishment of such a claim. If such notice be given within the specified time, the procedure for its consideration shall be as stated above in these General Conditions.

#### ARTICLE 59. COMPLETION

(a) The DISTRICT shall accept completion of the Agreement and have the Notice of Completion recorded when the entire work including punch list items shall have been completed to the satisfaction of the District. The work may only be accepted as complete by action of the DISTRICT'S Governing Board.

(b) However, the DISTRICT, at its sole option, may accept completion of the Agreement and have the Notice of Completion recorded when the entire work including individual portions of the work shall have been completed to the satisfaction of the DISTRICT, except for minor corrective items, as distinguished from incomplete items.

(c) A final walk through of the Project to determine completion of the Agreement and to record the Notice of Completion shall occur only upon a valid claim by CONTRACTOR that the Project is complete except for minor corrective items. Any erroneous claims of completion by CONTRACTOR resulting in a premature walk through shall be at CONTRACTOR'S sole cost and expense and DISTRICT shall make adjustments to the contract price by reducing the amount thereof to pay for any costs incurred by the DISTRICT due to the erroneous claims by the CONTRACTOR that the Project is complete. Minor corrective items shall be identified in the final walk through of the Project.

(d) If the CONTRACTOR fails to complete the minor corrective items prior to the expiration of the thirty-five (35) day period immediately following recording of the Notice of Completion, the DISTRICT shall withhold from the final payment an amount equal to twice the estimated cost, as determined by the DISTRICT, of each item until such time as the item is completed. At the end of such 35-day period, if there are items remaining to be corrected, the DISTRICT may elect to proceed as provided in the Article entitled "Adjustments to Contract Price."

#### ARTICLE 60. ADJUSTMENTS TO CONTRACT PRICE

(a) If CONTRACTOR defaults or neglects to carry out the work in accordance with the Project documents or fails to perform any provision thereof, DISTRICT may, after ten (10) days written notice to the CONTRACTOR and without prejudice to any other remedy it may have, make good such deficiencies.

(b) The DISTRICT shall adjust the total contract price by reducing the amount thereof by the cost of making good such deficiencies. If DISTRICT deems it inexpedient to correct work not done in accordance with the Project documents, an equitable reduction in the contract price shall be made, therefore.

#### ARTICLE 61. CORRECTION OF WORK

(a) CONTRACTOR shall promptly remove all work identified by DISTRICT as failing to conform to the Project documents, whether incorporated or not. CONTRACTOR shall promptly replace and re-execute its own work to comply with Project 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.

(b) If CONTRACTOR does not remove such 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 62. EXTENSION OF TIME - LIQUIDATED DAMAGES

(a) The CONTRACTOR and DISTRICT hereby agree that the exact amount of damages for failure to complete the work within the time specified is extremely difficult or impossible to determine. CONTRACTOR shall be assessed the sum of Five Hundred dollars (\$ 500.00 ) per day as liquidated damages for each and every day the work required under the Project documents remains unfinished past the time for completion, as set forth in the Agreement, and any extensions of time granted by the DISTRICT to the CONTRACTOR under the terms of the Project documents. The CONTRACTOR will pay to the DISTRICT or DISTRICT may retain from amounts otherwise payable to the CONTRACTOR, said amount for each day after failure to meet the requirements of the contract completion as scheduled in the Agreement. For purposes of this article, the work shall be considered "complete" in accordance with the provisions of Article 60, "COMPLETION", except that the work may be considered complete without formal acceptance by the DISTRICT Governing Board so long as the Governing Board, at its next regularly scheduled meeting, accepts the work.

(b) CONTRACTOR shall not be charged for liquidated damages, as set forth above, because of any delays in completion of work which are not the fault or negligence of CONTRACTOR, including but not restricted to acts of God. CONTRACTOR shall within ten (10) days of beginning of any such delay, notify DISTRICT in writing of causes of delay. CONTRACTOR shall provide documentation and justification to substantiate the delay and its relation to the Project's critical path. DISTRICT shall ascertain the facts and extent of delay and grant extension of time for completing work when, in its judgment, the findings of fact justify such an extension. The DISTRICT'S finding of fact thereon shall be final and conclusive on the parties hereto. Extension of time shall apply only to that portion of work affected by the delay and shall not apply to other portions of work not so affected.

ARTICLE 63. PAYMENTS WITHHELD

(a) In addition to amount which DISTRICT may retain under Article entitled "COMPLETION" and Article entitled "PAYMENTS," 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, or against and about the performance of work on the Project, including, without limitation, payments made pursuant to the Article entitled "PAYMENTS BY CONTRACTOR."

(2) The cost of defective work which CONTRACTOR has not remedied.

(3) Liquidated damages assessed against CONTRACTOR.

(4) Penalties for violation of labor laws.

(5) The cost of materials ordered by the DISTRICT pursuant to Article 33 entitled "MATERIALS AND WORK."

(6) The cost of completion of this Agreement if there exists a reasonable doubt that this Agreement can be completed for the balance then unpaid to CONTRACTOR.

(7) Damage to another contractor.

(8) Site clean-up as provided in Article 44 entitled "CLEANING UP."

(9) Payments to indemnify, defend, or hold harmless the DISTRICT.

(10) Any payments due to the District including but not limited to payments for failed tests, utilities or imperfections.

(11) Extra services for ARCHITECT.

(12) Extra services for the INSPECTOR including but not limited to re-inspection required due to CONTRACTOR'S failed tests or installation of unapproved or defective materials and CONTRACTOR'S requests for inspection and CONTRACTOR'S failure to attend the inspection.

(b) If the above grounds are in the opinion of the DISTRICT removed by or at the expense of CONTRACTOR, payment shall be made for amounts withheld because of them.

(c) DISTRICT may apply such withheld amount or amounts to payment of such claims or obligations at its discretion. In so doing, DISTRICT shall make such payments on behalf of CONTRACTOR. If any payment is so made by DISTRICT, then such amount 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 an accounting of such funds disbursed on behalf of CONTRACTOR.

(d) As an alternative to payment of such claims or obligations, DISTRICT, in its sole discretion, may reduce the total contract price as provided in Article 61 entitled "ADJUSTMENTS TO CONTRACT PRICE."

#### ARTICLE 64. EXCISE TAXES

(a) 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 documents necessary to show (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.

#### ARTICLE 65. NO ASSIGNMENT

(a) The CONTRACTOR shall not assign, transfer, convey, sublet or otherwise dispose of this Agreement or of its rights, title or interest in or to the same or any part thereof. If the CONTRACTOR shall assign, transfer, convey, sublet or otherwise dispose of the Agreement or its right, title or interest therein, or any part thereof, such attempted or purported assignment, transfer, conveyance, sublease or other disposition shall be null, void and of no legal effect whatsoever; and the Agreement 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 66. NOTICE

(a) Any notice from one party to the other or otherwise under the Agreement shall be in writing and shall be dated and signed by party giving such notice or by a duly authorized representative of such party. Any such notice shall not be effective for any purpose whatsoever unless served 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 mail, enclosed in a sealed envelope addressed to DISTRICT, and sent by registered or certified mail with postage prepaid;

(2) If notice is given to CONTRACTOR by personal delivery thereof to said CONTRACTOR or to CONTRACTOR'S superintendent at site of Project, or by depositing same in United States mail, enclosed in a sealed envelope addressed to said CONTRACTOR at its regular place of business or at such address as may have been established for the conduct of work under this Agreement, and sent by registered or certified mail with postage prepaid;

(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 mail, enclosed in a sealed envelope, addressed to such surety or person at the address of such surety or person last communicated by surety or other person to party giving notice, and sent by registered or certified mail with postage prepaid.

ARTICLE 67. NO WAIVER

(a) The failure of the DISTRICT in any one or more instances to insist upon strict performance of any of the terms of this Agreement 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.

END OF DOCUMENT 00 72 26

**DOCUMENT 00 73 00**

**SPECIAL CONDITIONS**

**PART 1 - GENERAL**

**A. CODE INFORMATION:**

1. Construction shall comply with the following parts of Title 24 of the California Code of Regulations. ( CCR )

2016 California Administrative Code (CAC), Part 1, Title 24 CCR\*  
2016 California Building Code (CBC), Part 2, Title 24 CCR  
(2015 International Building Code, Vol. 1 & 2, and 2016 California amendments)  
2016 California Electrical Code (CEC), Part 3, Title 24 CCR  
(2014 National Electrical Code and 2016 California Amendments)  
2016 California Mechanical Code (CMC), Part 4, Title 24 CCR  
(2015 IAPMO Uniform Mechanical Code and 2016 California amendments)  
2016 California Plumbing Code (CPC), Part 5, Title 24 CCR  
(2015 IAPMO Uniform Plumbing Code and 2016 California amendments)  
2016 California Energy Code (CEC), Part 6, Title 24 CCR  
2016 California Fire Code (CFC), Part 9, Title 24 CCR  
(2015 International Fire Code and 2016 California Amendments)  
2016 California Existing Building Code (CEBC), Part 10, Title 24 CCR  
(2015 International Existing Building Code and 2016 California Amendments)  
2016 California Green Building Standards Code (CALGreen), Part 11, Title 24 CCR  
2016 California Referenced Standards Code, Part 12, Title 24 CCR  
Title 19 CCR, Public Safety, State Fire Marshal Regulations  
2013 ASME A17.1/CSA B44-13 Safety Code for Elevators and Escalators

**B. TEMPORARY CONSTRUCTION AND SERVICES:** The contractor shall provide the following specific items of temporary construction and services; and special requirements of project.

1. Temporary Water: Water required in the performance of the Contract shall be provided by the Contractor.
2. Temporary Electric Service: Temporary electric service required in the performance of the Contract shall be provided by the Contractor.
3. Signs: No signs will be permitted on this project, except for the project sign as approved by the Architect, identifying captions over offices, certain directional signs, and warning signs required for safety and protection.
4. Construction Limits: The Contractor shall provide fences equal to not less than 6'-0" high of chain link or "hog wire" around that portion of the building or classroom where construction is taking place. The contractor shall maintain such fences in good condition during construction. Work required outside the fenced areas shall be accomplished as expediently as possible. Trenches or other hazards shall be protected, lighted, and barricaded to minimum time required for proper construction.
5. Contractor shall coordinate his work with the school administrator, shall keep the school informed of his schedule, and adapt his schedule to school activities.

**C. Interruption of Existing Utility Services.**

1. When it is Necessary to interrupt any existing utility service to make connections, a minimum of 48 hours advance notice shall be given the District and the Architect. Interruptions in utility services shall be of the shortest possible duration for the work at hand and shall be approved by the Architect.
  2. In the event any utility service is interrupted without the required 48 hours notice, then the Contractor shall be financially liable for all damages suffered by the District due to the unauthorized interruption.
- D. On completion of the project, the grades, surfaces, and turf within the "Construction Limits Line" shall be returned to a condition at least equal to that when construction first began.

END OF SECTION 00 73 00



SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY OF THE WORK

- A. The Work under this Contract necessary for and incidental to the execution and completion of all Work indicated in the Contract Documents for the construction of:

Imperial Valley College  
Building 200, 300 & 800 Modernization  
Imperial, California  
Imperial Community College District

1.02 GENERAL DESCRIPTION OF WORK

- A. The Work under this Contract includes furnishing all labor, materials, services and transportation, except as specifically excluded which is required for completion of the Project in accordance with the provisions of the Contract Documents.

1.03 REGULATORY REQUIREMENTS

A. CODE INFORMATION:

1. Codes: All work shall comply with the following Codes:

2016 BUILDING STANDARDS ADMINISTRATIVE CODE, PART 1, TITLE 24, CCR  
2016 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24, CCR  
2016 CALIFORNIA ELECTRIC CODE (CEC), PART 3, TITLE 24, CCR  
(2014 NATIONAL ELECTRIC CODE WITH CALIFORNIA 2016 AMENDMENTS)  
2016 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24, CCR  
(2015 UNIFORM MECHANICAL CODE WITH CALIFORNIA 2016 AMENDMENTS)  
2016 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24, CCR  
(2015 UNIFORM PLUMBING CODE WITH CALIFORNIA 2016 AMENDMENTS)  
2016 CALIFORNIA ENERGY CODE, PART 6 TITLE 24 CCR  
2016 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24, CCR  
(2015 INTERNATIONAL FIRE CODE WITH CALIFORNIA 2016 AMENDMENTS)  
2016 CALIFORNIA GREEN BUILDING STANDARDS CODE, PART II, TITLE 24 CCR  
2016 CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24 CCR  
TITLE 19 CCR, PUBLIC SAFETY, STATE FIRE MARSHALL REGULATIONS

B. Addenda and Change Orders:

1. In accordance with Part 1, Title 24, Section 4-338, California Code of Regulations, all addenda and change orders shall be approved by the Office of Regulation Services, Division of the State Architect (ORS / DSA).

- C. Perform work in accordance with the applicable provisions of Parts 1 through 12, inclusive, Title 24 (T-24), California Code of Regulations.

- D. Particular attention is directed to the following Sections of the Safety of Construction of Public Schools, Chapter 4, Part 1, T-24, CCR.

1. Section 4-343: Responsibility of the Contractor.
  2. Section 4-342: Continuous Inspection of the Work.
  3. Section 4-335: Tests.
  4. Section 4-336: Verified Reports.
- E. During the entire construction period, it shall be the sole responsibility of each Contractor to maintain conditions at the Project Site to meet the requirements of the Federal Occupational Safety and Health Administration (OSHA) and California occupational regulations. This provision shall cover the Contractor's employees and all other persons working upon or visiting the site. The Contractor shall become fully informed of all applicable standards and regulations and inform all persons and representatives responsible for work under this Contract.

#### 1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow:
1. Work by Owner, if required.
  2. Use of site and premises by Owner and public when and if Owner takes beneficial occupancy of portions of project.
- B. Access to Site: Coordinate with Architect.
- C. Building Exits During Construction: Maintain all exits. Do not obstruct at any time.
- D. Time and Construction Schedule Considerations affecting school operations if Owner requires partial occupancy.
1. Schedule all construction operations with Architect.
  2. Construction operations generating excessive noise, such as use of pneumatic tools and power actuated fastener equipment, shall be scheduled with the Architect and approved by owner.  
  
Locate all noise generating equipment, such as cut-off saws, in a remote location away from classroom areas.  
  
Provide Architect with 10 working days notice prior to commencing such operations.
  3. Construction operations, such as material deliveries, debris removal, and crane operations shall not occur when students, staff or visitors are present at construction site. Schedule such operations around school schedule, including recess and lunch periods. Where, in the sole opinion of the Architect the construction site is sufficiently remote or isolated that students, staff or visitors are not exposed to such operations construction operations may proceed as scheduled.
  4. After Owner takes a beneficial occupancy of portions of project the Prime Contractor, subcontractors and all support staff will not be allowed to enter such school facilities during hours school is in session. Where access is required to complete the work, coordinate access and scheduling with Architect for non-school time.

- E. Utility Outages and Shutdown: Provide minimum 15 working days notice of any utility interruption. No deviation to the commencement, nor duration of the outage or shutdown from the schedule agreed upon is allowed.
- F. Storage Areas: Coordinate with Architect. Contractor will establish acceptable path for products, staging areas and trash disposals.

1.05 OWNER OCCUPANCY

- A. The Owner may take beneficial occupancy of certain portions of the project for the conduct of normal school and business operations prior to final completion.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

1.06 FEES, BONDS AND PERMITS

- A. Obtain all required permits required for work under this contract, including but not necessarily limited to the following:
  - 1. Encroachment permits.
  - 2. Shoring, trenching and grading permits.
  - 3. Permits required for connection to public services and utilities.
- B. Arrange for all required improvements bonds required for work under this contract.
- C. All fees, improvement bond costs, public utility engineering fees and related fees, shall be paid by Contractor. Upon submission of documentation satisfactory to the Owner, such costs paid by Contractor shall be reimbursed by Owner.

1.07 PERMISSIBLE WORKING DAYS AND HOURS

- A. CONFORM TO Section 01 20 00 for required payment for Inspector's services performed during overtime hours.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 11 00

SECTION 01 20 00 – CONTRACT MODIFICATIONS AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Schedule of Values.
- B. Inspector of Record Payment Provisions
- C. Change Procedures.
- D. Progress Payment Coordination
- E. Payment for Contract Modifications
- F. Request for Information

1.02 RELATED DOCUMENTS OR SECTIONS

- A. Document 00 52 26 – Agreement Form.
- B. Document 00 72 26 – General Conditions.
- C. Document 01 33 00 – Submittal Procedures.

1.03 SCHEDULE OF VALUES

- A. Submit typed schedule on AIA Form G703-Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic print-out format may be considered, at Architects and General Contractors discretion.
- B. Submit Schedule of Values per schedule defined in General Conditions.
  - 1. Provide separate schedule of values for each building, and a single schedule for site work. Provide separate line items for each allowance.
- C. Format: Conform, to the requirements of the General Conditions. Identify each line item with number and title of the major specification section. Identify site mobilization bonds and insurance.
- D. Revise schedule to list approved Change Orders, with each Application for Payment.
- E. Include in each line item a directly proportional amount representing Contractors overhead and profit.

1.04 INSPECTOR OF RECORD PAYMENT PROVISIONS

- A. In the event Contractors performance of the work activities requires the District's Inspector of Record to work overtime, holidays or weekends, Inspector's cost shall be reimbursed by Contractor to District by deductive contract adjustment.

1.05 CHANGE PROCEDURES

- A. Architect's Supplemental Instructions (ASI): The Architect will advise of minor changes in the Work that does not involve an adjustment to Contract Price or Contract Time by issuing supplemental instructions on AIA Form G710.
- B. Proposal Request (PR): The Architect may issue a Proposal Request, which includes a detailed description of a proposed change with supplementary or revised drawings and specifications. Contractor shall prepare and submit an estimate within 10 days. If accepted by Owner, General Contractor will prepare Change Order.
- C. Change Order Request (COR):
  - 1. Contractor may submit a COR to the General Contractor for submittal to the Architect for changes in conditions, Owner changes, or other direction from the Architect, jurisdictional authority or Owners inspector
  - 2. Document the proposed change and its complete impact, including its effect on the cost and schedule of the work.
  - 3. General Contractor and Architect will review COR and either deny request or prepare a Change Order.
  - 4. Present total cost and schedule impacts in documentation, including all mark-ups permitted by General Conditions. Provide detailed back-up as required by Architect, including supplier costs, subcontractor labor time and rates, and all other data deemed necessary by Architect.
  - 5. Following final review by Architect of original and supplemental information, and if COR is accepted, no additional cost or schedule adjustments will be included.
- D. Change Order (CO): Change Order and Construction Change Directives will be issued by the Architect in accordance with procedures established in General Conditions.
  - 1. Change Order Forms: AIA G701 Change Order Form, current edition, or other format as selected by Architect.
  - 2. Execution of Change Orders: General Contractor will issue Change Orders for signatures of parties as provided in the General Conditions of the Contract.
- E. Construction Change Directives (CCD): Construction Change Directives (CCD) will be issued by the Architect.
  - 1. Construction Change Directive Forms: AIA G701 Change Order Form, current edition, or other format as selected by Architect.
  - 2. Unless otherwise agreed, maintain detailed records of work done under the direction of a CCD on Time and Materials basis. Provide full information required to substantiate costs for changes in the work.
- F. Execution of Change Orders: Architect will issue Change Orders for signature of parties as provided in the General Conditions of the Contract.
- G. All changes in contract for construction, regardless of effects on Contract Price or Contract Time, require the approval of DSA in accordance with Section 4-338, Part 1, T-24 CCR, "Addenda and Change Orders".

- A. See Section 01 77 19 – Closeout Procedures for requirements and relationship between progress payment and maintenance of record drawings.
- B. See Section 01 33 00 – Submittals for requirements and relationship between progress payment and construction schedule updates.
- C. Submit application on AIA Form G702-Application and Certificate for Payment as follows:
  - 1. Submit initial rough draft of pay application on or before the 20<sup>th</sup> day of each calendar month during Work progress, for a sum equal to ninety percent (90%) of the value of work performed up to the last day of the previous month, less the aggregate of previous payments to Architect, General Contractor, and Inspector of Record for review.
  - 2. General Contractor will return initial rough draft of pay application to Contractor following review by all parties.
  - 3. Submit six (6) copies of adjusted pay application to General Contractor for submittal to DISTRICT, consisting of 3 complete copies with all back-up and justification, 2 [partial copies (cover sheet, schedule of values and releases) and one pencil copy showing corrections required on initial rough draft. Failure to attach applicable attachments within the time frames specified by the General Contractor will result in processing not sooner than the next application period.
  - 4. Submit conditional lien releases for work covered by current application, and unconditional releases for work covered by previous month's billings.
- D. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- E. Payment Period: Monthly, scheduled as defined in General Conditions.

1.07 PAYMENT FOR CONTRACT MODIFICATIONS

- A. The Contractor shall compensate the Owner, by Owner-Contractor Contract adjustment, for the Architect's reasonable costs to modify Contract Documents required by work not performed in accordance with approved Contract Documents.

1.08 REQUEST FOR INFORMATION

- A. When the Contractor is unable to determine from the Contract Documents, the material, process or system to be installed, the Architect shall be requested to make a clarification of the indeterminate item.
  - 1. Whenever possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need, or the complexity of the item, Contractor shall prepare and submit an RFI to the General Contractor for submittal to the Architect.
- B. Submit all RFI's on attached form. Use of Contractors form will not be accepted. RFI's submitted by subcontractors or suppliers will not be accepted.
- C. RFI's shall be originated by the Contractor:

1. RFI's from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Contractor prior to submittal to the General Contractor for Architect's approval.
  2. RFI's sent by subcontractor directly to the General Contractor or Architect shall not be accepted and will be returned unanswered.
- D. Contractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFI's which request information available in the Contract Documents will be deemed either "improper" or "frivolous".
- E. In cases where RFI's are issued to request clarification of coordination issues, for example pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI's which fail to include a suggested solution will be returned unanswered with a requirement that the Contractor submit a complete request.
- F. The Architect will respond to legitimate and bonafide Requests for Information (RFI) initiated by Contractor.
- G. Contractor shall compensate the Architect, by Owner-Contractor Contract adjustment, for the Architects reasonable costs to respond to RFI's if the Architect determines:
1. The RFI does not reflect careful study and review of the documents, or;
  2. Demonstrates a lack of knowledge or construction competency reasonably expected of a Contractor performing the work.
- H. The Architect's action will be taken with such reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review.
- I. In the event the Contractor believes that a clarification by the Architect results in additional cost or time. Contractor shall not proceed with the work indicated by the RFI until an Instruction Bulletin is issued to the Contractor to proceed with the work. RFI's shall not automatically justify a cost increase in the work or a change in the project schedule.
1. Answered RFI's shall not be construed as approval to perform extra work.
  2. Unanswered RFI's will be returned with a stamp or notation: Not Reviewed.
- J. General Contractor shall prepare and maintain a log of RFI's, and at each weekly meeting, General Contractor shall furnish copies of the log showing outstanding RFI's. General Contractor shall note unanswered RFI's in the log.
- K. Contractor shall allow up to 14 days review and response time for RFI's, however, the Architect will endeavor to respond in a timely fashion to RFI's.

## PART 2 - PRODUCTS

Not Used

## PART 3 - EXECUTION

Not Used

IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION

OCTOBER 2019

ATTACHMENT:REQUEST FOR INFORMATION FORM

END OF SECTION 01 20 00



SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. In order to allow the Owner to compare total costs where alternate materials and methods might be used, and to enable the Owner's decision to awarding the Contract, certain alternatives have been established as described in this Section.

1.02 RELATED WORK DESCRIBED ELSEWHERE

- A. Pertinent sections of these Specifications describe the materials and methods required under the various alternatives.

1.03 SUBMITTALS

- A. Reflect all alternatives described in this Section in the bid submitted for the work, on Bid Form provided.

1.04 PRODUCT HANDLING

- A. If the owner elects to proceed on the basis of one or more of the alternatives, make all modifications to the work required in the furnishings and installation of the selected alternative or alternatives to the approval of the Architect and at no additional cost to the Owner other than as proposed on Contractor bid proposal.

PART 2 - PRODUCTS

- 2.01 ALTERNATES – Refer to Section 00 41 26 – BID FORM for project alternates.

PART 3 - EXECUTION

3.01 ADVANCE COORDINATION

- A. Immediately after award of Contract, thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of alternatives selected by the Owner; use all means necessary to alert those personnel and suppliers involved as to all changes in the Work caused by Owner's selection of alternatives.

3.02 SURFACE CONDITIONS

- A. Prior to installation of the alternative items, verify that all surfaces have been modified as necessary to accept the installation and that the manufacturer's current recommendations; in the event of discrepancy, immediately notify the Architect and proceed as directed.

END OF SECTION 01 23 00

SECTION 01 29 76 - APPLICATIONS FOR PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule.
- B. Schedule of Values: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
  - 1. Submit the Schedule of Values at the earliest possible date but no later than 7 days before submittal of the initial Applications for Payment.
- C. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section.
- D. Applications for Payment shall be consistent with previous applications and payments as certified by the General Contractor and Architect and paid for by the Owner.
- E. Payment-Application Times: As per General Conditions, Article 58.
- F. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 (OR EQUAL) as the form for Applications for Payment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 29 76

SECTION 01 31 19 - COORDINATION AND MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Coordination.
- B. Pre-construction meeting.
- C. Progress meetings.
- D. Pre-installation meetings.

1.02 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later and for accommodating items to be installed by the Owner.
- B. Coordinate sequence of Work to accommodate Owner occupancy, as specified in Document 01 12 00.

1.03 PRECONSTRUCTION MEETING

- A. General Contractor will schedule a meeting after Notice of Award.
- B. Attendance Required: General Contractor, Architect, Project Coordinator, Prime Contractors, Major Subcontractors, Project Inspector and key Owner personnel.
- C. Agenda:
  - 1. Contract Agreement:
    - a. Transmit Performance and Material Bonds to Architect.
    - b. Review General/Supplementary Conditions.
    - c. Deferred Approvals.
  - 2. Receive documentation from Contractor:
    - a. Construction Schedule
    - b. Schedule of Values
    - c. List of Subcontractors with addresses and phone numbers.
    - d. List of Submittals and estimated date of submittal.
  - 3. Project Administration:
    - a. Application for Payment, Project Schedule, Lien Release, As-built Documents.
    - b. LCP Requirements
    - c. Change Orders and Proposal Requests.
    - d. Submittals and Substitutions, Deferred Approvals.
    - e. Site Meetings.
    - f. Testing Lab.
    - g. Verified Reports
  - 4. Special Owner Conditions
    - a. Temporary facilities.
    - b. Owner Occupancy.

- c. Work by Owner.
  - d. Access to Site - Owner Contact.
- 5. Construction Process:
  - a. Contractor to give overview of construction.
  - b. Contractor to identify items to be selected by Architect/Owner and date selections must be made.
  - c. Contractor to review special requirements for equipment, safety, and noise.
- 6. Project Close-out:
  - a. Close-out Binder.
  - b. As-Built Documents.
  - c. Final Verified Reports.
- D. General Contractor to record minutes and distribute copies within five (5) days after meeting to participants and those affected by decisions made.

#### 1.04 PROGRESS MEETINGS

- A. General Contractor will schedule and administer meetings throughout progress of the work as needed.
- B. General Contractor will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: General Contractor, Project Coordinator, Prime Contractors, Major Subcontractors, Project Inspector, key Owner personnel and Architect as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems which impede planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of off-site fabrication and delivery schedules.
  - 7. Maintenance of progress schedule.
  - 8. Corrective measures to regain projected schedules.
  - 9. Planned progress during succeeding work period.
  - 10. Coordination of projected progress.
  - 11. Maintenance of quality and work standards.
  - 12. Effect of proposed changes on progress schedule and coordination.
  - 13. Other business relating to Work.
- E. General Contractor to record minutes and distribute copies within two (2) days after meeting to participants, and those affected by decisions made.

#### 1.05 PREINSTALLATION MEETING

- A. When required in individual specification sections, Contractor shall convene a pre-installation meeting prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.

- C. Notify Architect and General Contractor fourteen days in advance of meeting date.
  - D. Prepare agenda and preside at meeting:
    - 1. Review conditions of installation, preparation and installation procedures.
    - 2. Review coordination with related work.
  - E. Contractor to record minutes and distribute copies within two days, after meeting, to participants, Architect, General Contractor and those affected by decisions made.
- 1.06 COORDINATION OF SUBMITTALS
- A. Submit submittals as specified in Section 01 33 00 – Submittal Procedures.
- 1.07 COORDINATION OF SPACE
- A. Coordinate use of Project space and sequence of installation of mechanical, and electrical work, which is indicated diagrammatically on Drawings. Follow routings shown for pipes, ducts, and conduits as closely as practical, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
  - B. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.
- 1.08 COORDINATION WITH WORK BY OWNER
- A. Coordinate with General Contractor for any work by Owner and installation of all Owner provided and Contractor installed F.O.B. material, as it pertains to work in each Bid Package.
- 1.09 COORDINATION OF CONTRACT CLOSE-OUT
- A. Coordinate completion and cleanup of own work in preparation for Substantial Completion.
  - B. After Owner occupancy of premises, coordinate access to site for own work for correction or defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
  - C. Assemble and coordinate close-out submittals under provisions of Section 01 77 19, Contract Closeout Procedures.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 31 19

SECTION 01 32 16 – PROJECT CONSTRUCTION SCHEDULE

PART 1 – GENERAL

1.01 SUMMARY

- A. The work includes the preparation and submission of the sub-schedules and reports specified herein, including the up-to-date maintenance thereof as required by the GENERAL CONTRACTOR. The Conditions of the contract and the other sections of Division 1 apply to this section as fully as if repeated herein.

1.02 CONSTRUCTION SCHEDULE

- A. The enclosed “PROJECT CONSTRUCTION SCHEDULE” is composed of tentative starting dates and fixed duration’s for each major activity of work on the project.
  - 1. Within 14 days of Contractors receipt of District’s Notice of Award Letter, each Prime Contractor will be required to provide the following details to the General Contractor:
  - 2. Proposed manpower loading of each scheduled field activity in order to properly complete same within the PROJECT CONSTRUCTION SCHEDULE’S fixed duration’s.
  - 3. Establish submittal lead time’s which will allow for the proper review time by the Architect without delaying the timely scheduled procurement of products, materials, and/or assemblies.
  - 4. Establish fabrication and/or Procurement lead times which will maintain that no operation will be delayed from its scheduled starting date.
- B. Bid Package Contractor acknowledges that the Pull Planning (a.k.a. Last Planner®) supplemental means of activity scheduling is required to meet the project schedule. Therefore, Bid Package Contractor agrees to provide a supervisory and management level of representation at all Pull Planning weekly sessions. Bid Package Contractor also agrees to provide a Foreman level of representation at all Pull Planning daily update “quick meets”.
- C. CONTRACTOR must coordinate all work with all other contractors on the project through the GENERAL CONTRACTOR’S Project Superintendent in order to complete each activity of their work within the fixed durations assigned to same as shown on the “PROJECT CONSTRUCTION SCHEDULE”.
- D. Schedule start dates as shown on the PROJECT CONSTRUCTION SCHEDULE are referred to as “tentative” only to the affect that said dates will be continually adjusted either forward or backward by the GENERAL CONTRACTOR as the project progresses. Upon receipt of 48 hours advanced notice by the GENERAL CONTRACTOR to begin work on an activity, CONTRACTOR must properly man and perform the work of said activity and complete same within the noted number of consecutive working days or less assigned to said activity in the PROJECT CONSTRUCTION SCHEDULE.
- E. CONTRACTOR is expected to continually monitor all phases of the project field construction progress in order to insure that CONTRACTOR’S work is properly implemented into the overall project improvements.
- F. CONTRACTOR is expected to provide properly trained and skilled mechanics in adequate numbers and equipment needed and/or required in order to properly and efficiently complete

all work activities per the schedule. Should GENERAL CONTRACTOR have reason to believe at any time that CONTRACTOR is not providing an adequate workforce armed with the proper materials and/or equipment, GENERAL CONTRACTOR shall give CONTRACTOR written notice of same. Activity Manpower loading submitted in item 1.02-A-2 above shall in no way limit the responsibility of the CONTRACTOR to perform to the fixed duration requirements of the PROJECT CONSTRUCTION SCHEDULE.

- G. The time for total project completion shall be within the total time specified in the Contract documents. The GENERAL CONTRACTOR will use established contract fixed durations (refer to 1.02A) to prepare and update a Critical Path Method Schedule (C.P.M.) by buildings and site. This schedule will be the basis of weekly production review meetings and the method of measuring each CONTRACTOR'S performance and impact on dependent CONTRACTORS, required cure, and the assessment of liquidated damages.

ATTACHMENT: CONSTRUCTION SCHEDULE

END OF SECTION 01 32 16

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Submittal Procedures: Coordinate submittal preparation with construction, fabrication, other submittals, and activities that require sequential operations. Transmit in advance of construction operations to avoid delay.
1. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received. Specifically, in order to assure proper coordination of all project colors, no submittals which require the selection of material colors will be processed and released until all submittals requiring the selection of material colors have been submitted.
  2. Processing: Allow 14 days for initial review. Allow more time if the Architect must delay processing to permit coordination. Allow 14 days for reprocessing.
    - a. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.
  3. Submittal Preparation: Place a permanent label on each submittal for identification. Provide a 4- by 5-inch (100- by 125-mm) space on the label or beside title block to record review and approval markings and action taken. Include the following information on the label for processing and recording action taken.
    - a. Project name.
    - b. Date.
    - c. Name and address of the Architect.
    - d. Name and address of the Contractor.
    - e. Name and address of the subcontractor.
    - f. Name and address of the supplier.
    - g. Name of the manufacturer.
    - h. Number and title of appropriate Specification Section.
  4. Submittal Transmittal: Package each submittal appropriately. Transmit with a transmittal form. The Architect will not accept submittals from sources other than the Contractor.
  5. An extended processing period is required for submittals and resubmittal of “Deferred Approval Items” which required approval of the Division of the State Architect. The Owner cannot guarantee processing of such submittals within a stipulated time period.
- B. Contractor's Construction Schedule:
1. As per General Conditions, Article 32.
- C. Daily Construction Reports: Prepare a daily report recording events at the site. Submit duplicate copies to the GENERAL CONTRACTOR at daily intervals. Include the following information:
1. List of subcontractors at the site.
  2. High and low temperatures, general weather conditions.
  3. Accidents and unusual events.
  4. Stoppages, delays, shortages, and losses.
  5. Meter readings and similar recordings.



6. Emergency procedures.
  7. Orders and requests of governing authorities.
  8. Services connected, disconnected.
  9. Equipment or system tests and startups.
  10. Substantial Completions authorized.
- D. Shop Drawings: Submit newly prepared information drawn to scale. Indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information. Include the following information:
1. Dimensions.
  2. Identification of products and materials included by sheet and detail number.
  3. Compliance with standards.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
  6. Sheet Size: Except for templates and full-size Drawings, submit six copies on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches.
    - a. Do not use Shop Drawings without an appropriate final stamp indicating action taken.
- E. Product Data: Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.
1. Include the following information:
    - a. Manufacturer's printed recommendations.
    - b. Compliance with trade association standards.
    - c. Compliance with recognized testing agency standards.
    - d. Application of testing agency labels and seals.
    - e. Notation of dimensions verified by field measurement.
    - f. Notation of coordination requirements.
  2. Submittals: Submit 6 copies. The Architect will retain two and return the others marked with action taken. Electronic copies where applicable may be submitted in lieu of hard copies.
    - a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.
  3. Distribution: Furnish copies to installers, subcontractors, suppliers, and others required for performance of construction activities. Show distribution on transmittal forms. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
    - a. Do not use unmarked Product Data for construction.
- F. Samples: Submit full-size Samples cured and finished as specified and identical with the material proposed. Mount Samples to facilitate review of qualities.
1. Include the following:
    - a. Specification Section number and reference.
    - b. Generic description of the Sample.
    - c. Sample source.
    - d. Product name or name of the manufacturer.
    - e. Compliance with recognized standards.

- f. Availability and delivery time.
  2. Submit Samples for review of size, kind, color, pattern, and texture, for a check of these characteristics, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed. Where variations are inherent in the material, submit at least 3 units that show limits of the variations.
    - a. Refer to other Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar characteristics.
    - b. Refer to other Sections for Samples to be incorporated in the Work. Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
    - c. Samples not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.
  3. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. One set will be returned marked with the action taken. Maintain sets of Samples, at the Project Site, for quality comparison.
    - a. Unless noncompliance with Contract Documents is observed, the submittal may serve as the final submittal.
    - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
  4. Distribution of Samples: Distribute additional sets to subcontractors, manufacturers, and others as required for performance of the Work. Show distribution on transmittal forms.
- G. Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, and manufacturer's field reports required under other Sections of the Specifications.
1. Certifications: Where certification that a product or installation complies with specified requirements is required, submit a notarized certification from the manufacturer certifying compliance.
    - a. Signature: Certification shall be signed by an officer authorized to sign documents on behalf of the company.
- H. Architect's Action: Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.
1. Action Stamp: The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 33 00

SECTION 01 35 23 – CONTRACTOR SAFETY

1.01 GENERAL

A. HEALTH AND SAFETY POLICY

1. The policy of the District is to promote safety at a level to minimize personal injury and potential property damage.
2. Employees of contractors working on this project are required to meet or exceed all established and recognized codes and standards for safety and protection of personnel and property.
3. The safety guidelines included here are made available to you, the Contractor, as an extension of the safety clause in your Contract General Conditions Article 72.
4. These guidelines are not intended to be complete in every detail, but are merely of a general nature. The separate contractors are in no way relieved of their responsibilities for safety of persons and property, and compliance with all statutes, rules, regulations and orders applicable to the conduct of the work.
5. The possession, use of and/or sale of any alcoholic beverage or illegal controlled drug substance will not be permitted on or immediately adjacent to the job site by any contractor, contractor employee, subcontractor employer or associate.
6. The abuse of prescribed medication will not be permitted on or immediately adjacent to the job site by any contractor, contractor employee, subcontractor employee or associate.
7. This Contractor, and other contractors, share the responsibility of monitoring and enforcing, as necessary, A.5 and A.6 above. Any known, (or with due cause believed to be), violator of A.5 or A.6 shall be immediately reported to the General Contractor.
8. The District reserves the right to take corrective action, as deemed in the best interest of the project and the DISTRICT, for violation of any health or safety standard. This corrective action may include, but is not limited to; removal (from the job site) any unsafe tools/equipment, temporary work stoppage for any unhealthy or unsafe condition, immediate removal (from the job site) any person that is unwilling or incapable of conducting themselves in a manner that promotes a healthy and safe working atmosphere. Any person found to be repeatedly in violation of health and/or safety standards will be permanently removed from the site.

B. RESPONSIBILITIES

1. The District demands that all project contractors perform in a reasonable and safe manner.
2. The Contractors working on this project have the ultimate and total responsibility to conduct a sound accident control program as it pertains to their work and their employees, as well as to ensure safe working conditions for employees of other contractors.

3. The Contractor will ensure his employees cooperate with and coordinate safety matters with other contractors to form a joint safety effort.
4. Employees who have been, or will be exposed to excessive (measured against applicable standards) levels of toxic materials or harmful physical agents shall be notified by the Contractor. Notice of corrective action being taken shall be provided to the employees. Accurate records must be kept of all exposures which are required to be monitored under the State and Federal Codes.
5. In the event of a defense by the Contractor against unsafe independent employee actions, the Appeals Board requires that you must show evidence of the following:
  - a. That the employee was experienced in the job being performed;
  - b. That you as the employer have a well devised safety program which includes training employees in safety matters relating to their individual job assignments;
  - c. That you effectively enforce your safety program;
  - d. That you have and enforce a policy of sanctions against employees who violate your safety program; and
  - e. That the employee caused a safety infraction which he or she knew was in violation of your safety requirement.

C. SAFETY ACTIVITIES

1. Contractors will conduct or initiate:
  - a. Safety program as required by current State of California requirements.
  - b. Weekly "tool box" safety meetings between Contractor and Contractor's supervisors, foremen, employees, and subcontractors working on the project; and
  - c. Weekly safety inspections of your work area and those areas of work under your responsibility or shared responsibility as well as taking any other necessary safety precautions.

D. REPORTS

1. Submit all preliminary, weekly, periodic and special reports to the General Contractor. The Contractor is in no way relieved of the requirements for submission of reports to any agency or authority.
  - a. All reports listing deficiencies, accidents, or injuries shall show corrective action taken.
  - b. A weekly status and summary report of each "tool box" meeting held and items discussed. Each report shall also contain attendance names, signatures and company affiliation.
  - c. A weekly status report of inspection results. The attached status forms are for your convenience only.
  - d. A continuing list of deficiencies found, date identified, responsible party, corrective action and date corrected.
  - e. Accident reports and injury forms. Submit a copy of one of the following to the General Contractor for each case:
    - 1) California Division of Labor Statistics and Research Form 5020 (latest rev.), or;
    - 2) Federal OSHA Form 101, or;
    - 3) Insurance Company form similar to 1 or 2 above.
  - f. A copy of CAL/OSHA Form 200 "Log and Summary of Occupational Injuries and Illness".

2. Special Reports
  - a. Notify the General Contractor immediately of any accident involving injury to personnel or property; and complete written reports within 24 hours of a death or injury of five (5) or more employees as a result of one accident.
  - b. Copies of all toxic or harmful agent reports (See paragraph B.4.)
3. Governmental Reports
  - a. Notification of governmental authorities is the responsibility of each affected contractor.

E. SAFETY DEFICIENCY CORRECTION

1. All safety deficiencies will be corrected by contractors in accordance with the following priorities.
  - a. Immediate correction of items with any probability of major or minor injury to people.
  - b. Correction immediately of any accident probability which could involve people an/or equipment.
  - c. Correction within one day (or sooner) of potential injury or damage to property.

F. OUTSIDE SAFETY INSPECTIONS

1. Unannounced inspections by city, state or federal safety agencies or insurance companies may occur.
  - a. Contractors are to escort representatives of these agencies or companies directly to the General Contractor and assist him as required or directed.
  - b. If the General Contractor is not available, the Contractor's foreman or representative shall accompany the inspector on the inspection.

G. INVESTIGATING

1. All injuries are to be investigated by the contractors and reported.
2. The General Contractor shall be notified prior to proceeding with an investigation.

H. SAFETY STANDARDS AND CODE

1. All contractors are to provide their job supervision with applicable safety code publications and ensure they are familiar with the contents.
2. Occupation Safety and Health Administration Standards (latest applicable edition) on the designated applicable safety standards.
3. In states with OSHA approved plans, state codes will take precedence unless federal standards are more stringent, in which case federal standards shall apply.
4. On General Services Administration (GSA) projects, applicable sections of the GSA Manual Accident & Fire Prevention on Construction and Alteration Work will apply in addition to all other codes and standards.
5. All code and standard conflicts will be resolved by applying the most restrictive code and/or standard.

6. Suggested references for contractors are:
  - a. Safety & Health Regulation for construction, U.S. Department of Labor, OSHA, Volume 37, No. 243.
  - b. Construction safety orders, State Standard, CAL/OSHA, state of California, latest edition.
  - c. GSA Manual - GSA - PBSP 5900.3.
  - d. U.S. Army Engineering Manual - EM 385-1.
  - e. Accident Prevention, Associated General Contractors.
  - f. A short guide to the California Occupational Safety and Health Act - National Federation of Independent Business, 150 West 20th Avenue, San Mateo, California 94403.

I. REQUIRED NOTICES: TO BE VISIBLY DISPLAYED

1. Workers' Compensation Insurance Notice.
2. OSHA poster: Safety and Health Protection on the job.
3. State of California Department of Human Resources: Notice to Employees Unemployment Insurance - Disability Insurance.
4. Hard Hat Area Signs.
5. List of ambulances, doctors and hospitals with telephone numbers which can be called during an emergency.
6. Name and title of the safety representative from each contractor's organization.
7. Any other safety signs, slogans, etc. that will improve the general awareness of a joint safety program.

J. PERMITS

1. Permits from the Division in Industrial Safety are required before contractors may undertake the following kinds of work:
  - a. Construction of trenches or excavations which are 5 feet or more deep, into which a person is required to descend;
  - b. Construction of any building, structure, false work, or scaffolding more than three stories high.
2. The Division of Industrial Safety may investigate or confer with the employer before the start of work. If a pre-job safety conference between the Division of Industrial Safety personnel and the employer is a requirement specified by the Division of Industrial Safety at the time the permit is issued, employees or their representatives are to be included at the conference.
3. Permits must be posted at or near each place of employment requiring a permit. If posting at the actual job site is not possible, the permit must be available for inspection at all times on the site, or, in the case of a mobile unit, at the employer's head office in the area.
4. Additional permits may be required from the Division of Industrial Safety or other applicable governmental agencies. It is the responsibility of each contractor to determine, procure, and pay for their own such permits.

IMPERIAL COMMUNITY COLLEGE DISTRICT  
IMPERIAL VALLEY COLLEGE  
BUILDING 200, 300 & 800 MODERNIZATION

OCTOBER 2019

END OF SECTION 01 35 23

SECTION 01 45 24 – TESTING AND INSPECTION REQUIREMENTS FOR SCHOOL CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. Regulatory Requirements:

1. Part 1, Title 24, Section 4-335, California Code of Regulations: Testing required by the Division of the State Architect ( DSA ).
2. Part 2, Title 24, California Code of Regulations (2015 IBC and 2016 California Amendments): Inspections, testing and approvals required by individual sections therein.

B. Selection of the material required to be tested shall be by the laboratory or the Owner's representative and not by the Contractor.

C. Minimum test and inspections required: See Structural Tests and Inspections, Division of the State Architect form DSA 103 ( 2016 CBC ).

D. 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.

E. Selection and Payment of Testing Laboratory:

1. Owner will employ and pay for services of an independent Testing Laboratory approved by the Architect, DSA, and the Structural Engineer to perform inspection and testing in accordance with Part 1, Title 24, Section 4-335, California Code of Regulations.
2. Contractor shall pay for mileage and travel time for inspection services, required travel more than 300 miles from this project to test products purchased by Contractor. Testing Laboratory shall forward all billings and records of such costs to the Owner for approval. Such costs, if determined by the Owner to be attributable to the Contractor under this provision, will be deducted from Contractors final payment (or any funds due and payable) by change order.
3. When materials tested fail to meet requirements herein specified, they shall be promptly corrected or removed and replaced and retested. Costs involved in retesting will be paid by the Owner and deducted from Contractors final payment (or any funds due and payable) by change order.

F. Laboratory Responsibilities:

1. Laboratory shall be licensed to conduct testing and inspection operations in California. It shall be supervised by a State Licensed Civil Engineer who shall certify all reports.
2. Perform specified inspection, sampling and testing of Products in accordance with standards specified herein.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect, Project Inspector and Contractor by letter of observed irregularities of non-conformance of Work or Products.
5. Immediately upon Testing Laboratory determination of a test failure, the laboratory shall telephone the results of test to Architect. On the same day laboratory shall send written test results to those named on the distribution list below.



G. Laboratory Reports:

1. After each inspection and test, the testing facility shall promptly (no later than 14 days after test is complete) submit one copy of laboratory report to the following.
  - a. Owner
  - b. Architect
  - c. Project Inspector
  - d. General Contractor
  - e. Structural Engineer
  - f. Mechanical and Electrical Engineers ( Related Tests and Inspections )
  - g. Division of the State Architect
2. Test reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Titles 21 and 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.
3. Submit a report verifying that tests and inspections herein specified and otherwise required have been completed and material and workmanship complies with the contract documents. Such verification reports shall be submitted at any 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.

H. Limits on Testing Laboratory Authority

1. Laboratory may not release, revoke, alter or enlarge on requirements of Contract Documents.
2. Laboratory may not approve or accept any portion of the Work.
3. Laboratory may not assume any duties of the Contractor.
4. Laboratory has no authority to stop work.
5. Laboratory shall not interpret code in relation to the design of the building.

I. Contractor Responsibility

1. Deliver to laboratory at designated location, adequate samples of materials proposed to be used which require testing.
2. Cooperate with laboratory personnel, Owner's Representatives, Project Inspector and the Architect, and provide access to the work including weekends and after hours and to manufacturer's facilities.
3. Provide incidental labor and materials and facilities to provide at all times, safe access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
4. Notify General Contractor, Project Inspector and laboratory 24 hours prior to expected time and operations requiring inspection and testing services. Also notify Owner in advance of manufacturer of materials to allow testing at source of supply for materials which require testing and inspection.
5. Inspecting and Testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

J. Inspection by the Owner

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

2. The Owner shall have the right to reject materials and workmanship which are defective or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be removed from the premises without cost to owner the Owner. If the Contractor fails to correct such rejected work within a reasonable time, fixed by written notice, the Owner will correct same and charge the expense to the Contractor by Change Order.
3. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor by change order.

K. Inspector - Owners:

1. An Inspector employed by the Owner and approved by the Division of the State Architect in accordance with the requirements of State of California Code of Regulations, Title 24 Part 1 will be assigned to the continuous inspection of the work. His duties are specifically defined in Section 4-342 Part I, Title 24 CCR.
2. 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 character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

L. Inspector -- Owner -- FIELD OFFICE: See General Conditions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 45 24

SECTION 01 50 00 – CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water service and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, water, dust, noise & pollution control, parking and traffic control, and protection of the Work.
- C. Construction Facilities: Access roads, progress cleaning, field offices, sheds and removal.
- D. Operational Requirements: Security, project ID/signage and documentation.

1.02 RELATED SECTIONS

- A. Section 01 77 19 - Contract Closeout Procedures.

1.03 TEMPORARY ELECTRICITY

- A. Temporary power will be provided by Electrical Contractor within 50' of buildings.
- B. Any temporary power requirements beyond the 50' provided will be the responsibility of the Contractor requiring the same.
- C. All welding will be done with self contained gas powered units.
- D. Provide generator power for your operations until temporary power is available.

1.04 TEMPORARY LIGHTING

- A. Each Contractor shall be responsible to provide and maintain all temporary lighting as required to safely access and perform their scope of work.
- B. Provide and maintain adequate lighting for construction operations for own work.
- C. Provide adequate lighting for security of construction operations and storage areas for own work. Coordinate with General Contractor.
- D. Provide and maintain at ALL times, temporary lighting and exit/path devices in corridor areas as required by applicable codes.

1.05 TEMPORARY HEAT

- A. Provide temporary heat devices as required to maintain specified conditions for construction operations.
- B. Use of permanent equipment for temporary heating is prohibited without prior approval by Architect.
- C. Unless specified elsewhere, maintain minimum 50°F at interior construction areas.

1.06 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials to dissipate humidity and to prevent accumulation of dust, fumes, vapors or gases. Where necessary to comply with item B., provide ducted ventilation system.
- B. Locate ventilation discharge point at an approved location, away from walkways, HVAC intakes, windows of occupied areas, and other similar locations.
- C. Utilize temporary fan units as required to exhaust noxious fumes directly to the outside of the building.

1.07 TELEPHONE

- A. Provide, maintain and pay for own telephone service and associated office equipment to own field office as required. No public telephone will be provided.

1.08 TEMPORARY WATER SERVICE

- A. Plumbing Contractor will provide and maintain for suitable water source for construction operations.
- B. Each Prime Contractor is responsible for their own distribution, including but not limited to water trucks, hoses, piping, etc. from water source to area of work, as required for own Work.

1.09 TEMPORARY SANITARY FACILITIES

- A. General Contractor will provide and maintain required temporary chemical type toilet facilities and enclosures.

1.10 BARRIERS AND BARRICADES

- A. Exteriors
  - 1. Provide barriers to protect adjacent properties from damage from construction operations and demolition. When regulated by Codes, such legal requirements for protection shall be considered as minimum requirements. Provide protective measures in excess of such minimum requirements as specified or required.
  - 2. Provide barricades around excavations.
  - 3. Provide protection for all plant life designated to remain.
    - a. Replace damaged plant life with approved equivalent.
    - b. Erect tree protection within 3 days of mobilization. Enclose trees designated to remain with 2 x 4 wood frame. Install frame minimum 6 feet from trunk diameter, all sides. Provide 4 x 4 post supports, minimum 3 feet high, embedded 3 feet, at 3 foot on center maximum. Wrap frame with snow type fencing in bright iridescent color visible at night.
    - c. Protect non-owned vehicular traffic, stored materials and structures from damage.
- B. Interior

1. Where required to permit Owners ongoing operations, provide barriers as specified.
  - a. Construct barriers as metal framed/fire-resistive gypsum board fire resistive corridor construction, with self-closing, latching door assembly. Provide temporary partition and door assembly fire resistivity rating equal to the assembly being replaced. Close joints and seal edges at intersections with existing surfaces.
  - b. Use of sheet plastic dust barriers in place of rated assemblies is prohibited.
2. Protect existing surfaces, equipment and furnishings from damage from construction operations and demolition. Where necessary, remove and store in separate area.
3. Where demolition or construction operations generate fine dust or airborne particulates, provide fire retardant drop cloths, screening or other approved barriers to prevent dust inhalation into existing cabinet interiors, equipment, drawers, and similar conditions.
4. Provide contamination control mats at construction access locations to prevent tracking of construction dust and dirt into owner occupied portion of building.

#### 1.11 FENCING

- A. A temporary fence with locked entrance gates will be provided to enclose the Work to deter unauthorized entry, vandalism and/or theft.
  1. The fence will be a 6 foot high commercial grade chain link with vehicular and pedestrian gates and locks.
  2. Any Contractor requiring fencing/barricades above and beyond the fencing shown on the plan sheet, for the execution of their work, shall furnish, install and maintain same as required by local authorities and state safety ordinances and as necessary for the protection of the public.

#### 1.12 DUST CONTROL

- A. Conduct earthwork operations in a manner to prevent windblown dust and dirt from interfering with the progress of the Work, DISTRICT's activities and the existing occupied structures in the areas immediately adjacent as well as adjacent properties.
- B. Periodically water construction areas as required to minimize accumulation of dust and dirt.
- C. Water spray or cover with tarpaulins truck loads of soil to additionally minimize generation of dust and dirt from construction operations.
- D. Prevent dust and dirt from accumulating on walks, roadways, parking areas and from washing into sewer and storm drain lines.

#### 1.13 POLLUTION CONTROL

- A. Provide methods, means and facilities to prevent contamination of soil, water and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Burning of refuse, debris or other materials will not be permitted on the Site.
- C. Comply with regulatory requirements and anti-pollution ordinances during the course of construction and disposal operations.

#### 1.14 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work areas to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

#### 1.15 PARKING AND TRAFFIC CONTROL

- A. Parking Criteria
  - 1. Space is limited. Coordinate location and number of parking spaces required with General Contractor.
- B. Traffic Control
  - 1. Traffic Maintenance: Prior to the start of own work, determine the routing of construction vehicles, and the safeguards and procedures necessary to carry out the work. Obtain the General Contractor's approval of the onsite traffic routes and for any removal, temporary relocation and reinstallation of traffic control signage. Obtain traffic control approval by local jurisdiction for street work. In addition:
    - a. Be responsible for controlling construction traffic within and adjacent to the site for own work.
    - b. Provide entrances, lifts and safeguards required or necessary to the progress of the work, and effectively control such traffic to provide minimum hazard to the work and all persons.
    - c. Route construction equipment, trucks, and similar vehicles via existing public streets to and from the site as approved by the governing authorities.
    - d. Obtain and pay for permits and inspections made necessary by use of public street, sidewalks, curbs, and paving. Post guarantees and bonds that may be required, and repair and make good any damages thereto acceptable to the authorities having jurisdiction.
    - e. Construct and maintain temporary walks for pedestrians. Keep streets adjacent to the site open to vehicular and pedestrian traffic.
    - f. Maintain constant access for police, fire and ambulance service.
    - g. Provide and maintain for proper control of traffic and safety of all concerned. Provide all necessary barricades, suitable and sufficient lights, reflectors, and danger signals.
    - h. Provide warning and closure signs, directional and detour signs, and whatever additional measures are necessary.
    - i. Indicate on a 24-hour basis restricted and dangerous conditions existing on or adjacent to the site. Illuminate barricades, danger signals, warning signs and obstructions at night. Keep warning lights burning from sunset until sunrise.

#### 1.16 ACCESS ROADS

- A. Provide and maintain access to fire lanes and fire hydrants at all times, free of obstructions. Coordinate location, locking device and dimension of gates with fire department having jurisdiction.
- B. Designated existing on-site roads may be used for construction traffic.

- C. Do not permit delivery trucks to block, park or wait on public streets or in student bus lane.

1.17 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Each applicable Contractor shall remove debris and rubbish from pipes chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Each applicable Contractor shall broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Remove waste materials, debris, and rubbish from interior spaces daily and from site weekly and dispose of off-site.
- E. Maintain all public streets free of dust, mud, and debris as required by jurisdictional authority.

1.18 TEMPORARY FACILITIES AND SHEDS

- A. Locate temporary facility and shed, as required, where directed by General Contractor and maintain in a safe and sanitary condition at all times until completion of the Contract.
- B. Contractor shall cooperate with General Contractor and other Contractors to coordinate space requirements for Contractor's equipment, job office, operation, and material storage. Contractor shall move equipment, trailers, and material storage at the request of the General Contractor with no additional compensation.
- C. Field offices shall remain the property of the Contractor and shall be removed from the site upon completion of the work.
- D. Furnish, install and maintain tool cribs, sheds and storage units for the Contractors use as necessary for the proper execution of the work.
  - 1. Provide all necessary barricades, warning devices and enclosures required to protect and direct visitors and staff around tool and equipment located in passageways and corridors.
  - 2. Return all small tools and secure in locked compartments or cribs at close of workday.
  - 3. Safe-off or lock all equipment and large tools. Disable from malicious or accidental start-up and operation.
- E. Requirements of regulatory agencies: Comply with requirements or regulatory agencies having jurisdiction. Obtain and apply for permits required by governing authorities.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials for own work, prior to Final Application for Payment.
- B. Clean and repair damage caused by installation or use of temporary work.

- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

#### 1.20 SECURITY

- A. Provide security and facilities as necessary to protect work and staff from vandalism, unauthorized entry, theft, damage, or assault.
- B. Within a 48-hour period, replace or repair, to District and Architect's satisfaction, all surfaces or items damaged by graffiti during course of construction.
- C. Where Owner has given approval to take fire detection system off-line, return system to active status at completion of work or end of each work period.
  - 1. Fire Safety During Construction: Comply with provisions of Article 87, California Fire Code, CCR, including but not limited to, access roads, fire extinguisher and fire watch regulations.
  - 2. Where security or fire detection systems are disabled for any reason, including where owner has given approval for such system shut-down, provide fire watch or security guard service as directed by Owner and at no additional cost to the Owner.
- D. All Contractor staff, subcontractors and suppliers shall notify General Contractor when on site, and sign in and out as directed by General Contractor - Notify General Contractor when work is completed or shut-down for that work period.
- E. No smoking or use of tobacco products is permitted on school property.
- F. Radio or other music is not permitted at any time.

#### 1.21 DOCUMENTATION OF EXISTING IMPROVEMENTS

- A. Use of explosives is not allowed.
- B. Prior to beginning any alterations, including grading, paving, landscape, etc, prepare a record of existing improvements affected by the work of this contract, including but not limited to the following.
  - 1. Off-site street and frontage improvements, identifying all evidence of existing settlement, cracking and other signs of damage, distress or failure.
  - 2. Condition of adjacent properties, including fencing, retaining walls, pools, paving, and structures. Clearly identify all evidence of existing settlement, cracking, alignment and other signs of damage, distress or failure.
  - 3. Condition of landscaping, including canopy overhang, shrubbery and grass/groundcover. Clearly identify all evidence of existing trunk damage, grass compaction, crushed and broken shrubs and other signs of distress or failure.
- C. Format
  - 1. Prepare record documentation using color video and any other means of documentation necessary to describe existing condition.
  - 2. Prepare color video at such scale and detail as required to document existing damage occurred prior to beginning work. If the record documents do not clearly



- show damage as a pre-existent condition, Contractor shall be responsible for repair or replacement of such damaged improvements.
3. Obtain Owner's Inspector of Record certification that documents were prepared prior to beginning construction.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 50 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Cutting and Patching Proposal: Submit a proposal describing procedures in advance of the time cutting and patching will be performed. Request approval to proceed. Include the following:
1. Describe extent of cutting and patching. Show how it will be performed and indicate why it cannot be avoided.
  2. Describe changes to existing construction. Include changes to structural elements and operating components and changes in the building's appearance and other significant visual elements.
  3. List products to be used and firms that will perform Work.
  4. Indicate dates when cutting and patching will be performed.
  5. Utilities: List utilities that will be disturbed or relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
  6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
  7. Approval to proceed does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.
- B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
1. Unless Specifically shown on plans no structural member shall be cut, neither drilled nor notched without prior written authorization from the structural engineer and the Division of the State Architect.
  2. Obtain approval before cutting and patching the following structural elements:
    - a. Foundation construction.
    - b. Bearing and retaining walls.
    - c. Timber and primary wood framing.
- C. Operational Limitations: Do not cut and patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut and patch operating elements in a manner that would increase maintenance or decrease operational life or safety.
1. Obtain approval before cutting and patching the following operating elements or safety related systems:
    - a. Primary operational systems and equipment.
    - b. Fire protection systems.
    - c. Electrical wiring systems.
- D. Visual Requirements: Do not cut and patch exposed construction in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
1. Retain the original Installer to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer, engage a recognized experienced and specialized firm.
    - a. Ornamental metal.

- b. Matched-veneer woodwork.
  - c. Stucco and ornamental plaster.
- E. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged in such a manner as not to void warranties.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Use materials identical to existing materials. Use materials that visually match adjacent surfaces to the fullest extent possible if identical materials are unavailable. Use materials whose performance will equal that of existing materials.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action.
- 1. Before proceeding, meet with parties involved. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

### 3.02 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

### 3.03 PERFORMANCE

- A. Performance: Employ skilled workmen. Proceed at the earliest feasible time and complete without delay.
- 1. Cut construction to install other components or perform other construction and subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut using methods that will not damage elements retained or adjoining construction. Comply with the original Installer's recommendations.
- 1. Use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
  4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
  5. Where services are required to be removed, relocated, or abandoned, by-pass utility services before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Inspect and test patched areas to demonstrate integrity of the installation.
  2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove floor and wall coverings and replace with new materials to achieve uniform color and appearance.
    - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire surface containing the patch after the area has received primer and second coat.
  4. Patch, repair, or rehang ceilings as necessary to provide an even-plane surface of uniform appearance.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar items. Clean piping, conduit, and similar features before applying paint or finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

SECTION 01 74 00 PROGRESS AND FINAL CLEANING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Maintain project site, surrounding areas, and public properties free from accumulations of waste, debris, and rubbish caused by operations.
- C. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean sight-exposed surfaces. Leave project site clean and ready for occupancy.

1.02 GENERAL

- A. Conduct cleaning and disposal operation in accordance with legal requirements.
  - 1. Do not dump or bury rubbish and waste materials on project site.
  - 2. Do not dispose of volatile wastes in storm or sanitary drains.
- B. Hazards Control:
  - 1. Store volatile wastes and hazardous materials (i.e. paint, oils, etc.) in covered metal containers, and remove from premises daily.
  - 2. Prevent accumulation of wastes which create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.

1.03 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.04 PROGRESS CLEANING DURING CONSTRUCTION

- A. Execute cleaning daily to ensure project site, Owner's premises, adjacent and public properties are maintained free from accumulations of waste materials, debris and rubbish.
- B. Provide on project dump site, containers for collection of waste materials, debris, and rubbish.
- C. Remove waste materials, debris and rubbish from Owner's premises and legally dispose of off Owner's property.
- D. Vacuum clean interior areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.
- E. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

1.05 FINAL CLEANING

- A. Employ experienced workers or professional cleaners for final cleaning.

- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of accessible concealed spaces.
- C. Clean glass and surfaces exposed to view. Remove temporary labels, stains, and foreign substances.
- D. Repair, patch, and touch-up marred surfaces to specified finish, and to match adjacent surfaces.
- E. Broom-clean paved surfaces.
- F. Polish transparent and glossy surfaces.
- G. Vacuum carpeted and soft surfaces.
- H. Wax and polish resilient floor surfaces.
- I. Wash and polish ceramic surfaces.
- J. Clean machinery and equipment.
- K. Clean plumbing fixtures to a sanitary condition. Use non-corrosive, non-abrasive cleaning materials.
- L. Replace filters of operating equipment.
- M. Clean and polish light fixtures.
- N. Clean and polish hardware and metal surfaces.
- O. Clean walls and ceilings of dust, dirt, stains, hand marks, paint spots, plaster drops, and like defects.
- P. Clean construction site. Sweep paved areas and rake clean landscaped surfaces.
- Q. Clean out and flush drains from construction debris. Flood-test prior to occupancy.
- R. Remove waste and surplus materials, rubbish, and construction facilities from the site. Do not use Owner's waste removal system or any system belonging to owners of adjacent properties.
- S. Keep project clean until it is occupied by the Owner.
- T. Schedule final cleaning as accepted by the GENERAL CONTRACTOR to enable the ARCHITECT and SCHOOL DISTRICT to accept a completely clean project.

PART 2 – PRODUCTS – Not Used

PART 3 – EXECUTION – Not Used

END OF SECTION 01 74 00

SECTION 01 74 23 FINAL CLEANING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Buildings 200, 300, and 800 Modernization – Final Cleaning, as indicated on the drawings, specified herein, or reasonably required to complete the work.

1.02 GENERAL

- A. Conduct cleaning and disposal operation in accordance with legal requirements.
  - 1. Do not dump or bury rubbish and waste materials on project site.
  - 2. Do not dispose of volatile wastes in storm or sanitary drains.
- B. Hazards Control:
  - 1. Provide adequate ventilation during use of volatile or noxious substances.

1.03 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.04 FINAL CLEANING

- A. Employ experienced workers or professional cleaners for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of accessible concealed spaces.
- C. Clean glass and surfaces exposed to view; remove temporary labels, stains and foreign substances.
- D. Broom clean paved surfaces.
- E. Clean transparent and glossy surfaces.
- F. Vacuum carpeted and soft surfaces.
- G. Wax and polish resilient tile floor surfaces. Provide (2) coats of wax.
- H. Clean ceramic surfaces.
- I. Clean plumbing fixtures to a sanitary condition. Use non-corrosive, non-abrasive cleaning materials.
- J. Clean light fixtures and appliances.
- K. Clean hardware and metal surfaces.

- L. Clean walls and ceilings of dust, dirt, and like defects.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION 01 74 23



SECTION 01 77 19 CONTRACT CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division One Specification Sections, apply to this section.
- B. This section includes administrative and procedural requirements for contract closeout, including but not limited to the following:
  - 1. Inspection procedures.
  - 2. Operation and maintenance manuals.
  - 3. Warranties.
  - 4. Instruction of Owner's personnel.
- C. Related Sections include the following:
  - 1. Divisions 2 through 33, for specific closeout and special cleaning requirements for products of those sections.

1.02 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of substantial completion, complete the following. List items below that are incomplete in request.
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the work is not complete.
  - 2. Advise Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases permitting Owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Prepare and submit Project Record Documents, operation and maintenance manuals.
  - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  - 7. Complete startup testing of systems.
  - 8. Submit test/adjust/balance records.
  - 9. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
  - 10. Complete final cleaning requirements, including touchup painting.
- B. Inspection: Submit a written request for inspection for substantial completion via the GENERAL CONTRACTOR. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, which must be completed or corrected before certificate will be issued.
  - 1. Reinspection: Request reinspection when the work identified in previous inspections as incomplete is completed or corrected.
  - 2. If a reinspection identifies work that remains uncompleted, the Contractor shall be responsible for the cost of additional inspections by the Architect. The Architect will submit a time and

material invoice to the Owner, who will deduct the amount from the balance due to the Contractor.

3. Results of completed inspection will form the basis of requirements for final completion.

### 1.03 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 section "Payment Procedures".
2. Submit certified copy of Architect's substantial completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Revise paragraph and subparagraph below to comply with office policy and project requirements.

- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the work identified in previous inspections as incomplete is completed or corrected.
2. If a reinspection identifies work that remains uncompleted, the Contractor shall be responsible for the cost of additional inspections by the Architect. The Architect will submit a time and material invoice to the Owner, who will deduct the amount from the balance due to the Contractor.

### 1.04 OPERATION AND MAINTENANCE MANUALS

- A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual specification sections and as follows:

1. Operation Data:
  - a. Emergency instructions and procedures.
  - b. System, subsystem, and equipment descriptions, including operating standards.
  - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
  - d. Description of controls and sequence of operations.
  - e. Piping diagrams.
2. Maintenance Data:
  - a. Manufacturer's information, including list of spare parts.
  - b. Name, address, and telephone number of installer or supplier.
  - c. Maintenance procedures.
  - d. Maintenance and service schedules for preventive and routine maintenance.
  - e. Maintenance record forms.
  - f. Sources of spare parts and maintenance materials.
  - g. Copies of maintenance service agreements.
  - h. Copies of warranties and bonds.

- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy duty, 3-ring, vinyl covered, loose leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," project name, and subject matter of contents.

#### 1.05 WARRANTIES

- A. Submittal Time: Submit written warranties to the General Contractor for designated portions of the work where commencement of warranties, other than date of substantial completion, is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the project manual.
  - 1. Bind warranties and bonds in heavy duty, 3-ring, vinyl covered, loose leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch (115 by 280 mm) paper.
  - 2. Provide heavy paper dividers with plastic covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES", project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

#### PART 2 – PRODUCTS – Not Used

#### PART 3 - EXECUTION

##### 3.01 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Provide instructors experienced in operation and maintenance procedures.
  - 2. Provide instruction at mutually agreed upon times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
  - 3. Schedule training with Owner with at least 14 days advanced notice.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual specification sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
  - 1. System design and operational philosophy.
  - 2. Review of documentation.
  - 3. Operations, Adjustments and Troubleshooting.
  - 4. Maintenance and Repairs.

END OF SECTION 01 77 19

SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Maintain at project site one copy of:
  - 1. Complete contract documents (prints and reproducibles) as noted below:
    - a. Specifications and addenda.
    - b. Reviewed shop drawings and samples.
    - c. Modifications: Change orders and other written amendments to the contract.
    - d. Field Test Records.
- C. Store record documents in temporary field office, separate from documents used for construction. Replace soiled or illegible documents.
- D. Provide files and racks for storage of documents.
- E. Maintain documents in clean, dry, and legible condition.
- F. Do not use record documents for construction purposes.
- G. Make documents available at all times for inspection by Owner and Architect.
- H. Drawings shall be same size and format as original construction documents.

1.02 MARKING DEVICES

- A. Provide fine ballpoint colored pens for marking.

1.03 RECORDING

- A. Label each document (on first sheet or page) “RECORD DRAWING” in 2 inch high printed letters.
- B. Keep record documents current. Record in concise and neat manner and on a weekly basis all actual revisions to the work.
  - 1. Do not permanently conceal any work until required information has been recorded.
  - 2. Drawings. Legibly mark to record actual construction:
    - a. Measured depths of various elements of foundation in relation to main floor level or survey datum.
    - b. Measured horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements. Identify drains and sewers by invert elevation.
    - c. Measured locations of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of the work. Identify ducts, dampers, valves, access doors and control equipment wiring.
    - d. Field changes of dimension and detail.

- e. Changes made by change orders and other modifications, including all clarification drawings, instruction bulletins, and other construction correspondence.
  - f. Details not on original drawings.
- C. Specifications and Addenda: Legibly mark and record at each product section description of actual products installed to include the following:
- 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment.
  - 2. Authorized product substitutions or alternates utilized.
  - 3. Changes made by change orders and other modifications.
  - 4. Other matters not originally specified.
- D. Shop Drawings and Samples: Maintain as record documents; legibly annotate shop drawings and samples to record changes made after review.
- E. Record Drawings:
- 1. The Contractor shall furnish a set of reproducible structural, mechanical, plumbing, electrical and landscape record drawings upon completion of construction, to the requirements noted above. These record drawings shall be in the same size and format as the original drawings.
  - 2. Structural, mechanical, plumbing, and electrical information shall include circuiting, wiring sizes, equipment/member sizing, etc., drawn in a professional manner similar to that indicated on the construction drawings. The record drawings for each discipline shall represent a complete picture of that entire system, as constructed.

#### 1.04 SUBMITTALS

- A. Obtain Inspector's signed certification that record documents have been fully updated prior to submitting monthly payment requests. Compliance is mandatory before payment will be made.
- B. Submit Inspector's certified documents to Architect with claim for final application for payment. Fully complete record documents are a prerequisite to final payment.
- C. At completion of project, deliver all record documents to Architect. Architect and consultants will review the completed record drawings, both prints and mylars, and return to the Contractor with required changes annotated.
  - 1. Architect will transfer data from the record drawing prints to the Architect's office originals.
- D. Accompany submittal with transmittal letter containing:
  - 1. Date
  - 2. Project title and number
  - 3. Contractor's name and address
  - 4. Number and title of each record document
  - 5. Certification that each document, as submitted, is complete and accurate and signature of Contractor or his authorized representative.

PART 2 – PRODUCTS – Not Used

PART 3 – EXECUTION – Not Used

END OF SECTION 01 78 39

SECTION 02 41 16 STRUCTURE DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: Complete all demolition work as shown on contract documents or as required to permit the installation of new construction, including but not limited to the following
  - 1. Remove existing structures

1.02 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.
- B. Record drawings at Project closeout according to Section 01 77 19 "Contract Closeout."
  - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.03 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition work similar to that indicated for this project.
- B. Public Utilities: Give all required notices, pay fees and charges, and arrange for disconnection and removal of abandoned public utilities and meters.
- C. Photographic and Video Documentation: Refer to Section 01380. Before starting work of this section, provide one set of photographs and one video of existing conditions to be affected by the demolition work. Provide progress videos as the work of demolition progresses, at intervals as approved, illustrating substrates, connections, concealed conditions, preservation of historic construction, and other conditions which will benefit subsequent work.

1.04 DEFINITIONS: The following terms have the meanings indicated when used in this section and on related drawings.

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.
- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

#### 1.05 ENVIRONMENTAL CONDITIONS

- A. Hazardous Materials: Prior to starting work, obtain from the Owner certification that hazardous materials have been removed. In the event additional material which is suspected to be friable asbestos or other regulated hazardous material is encountered during the demolition work, the Contractor shall stop work in such areas and notify the Owner. The materials will be inspected and tested, if necessary, by the Owner. If the material is found to be friable asbestos or other hazardous material, the Owner will provide for its removal or encapsulation without delay at Owner's expense. After treatment the Owner will test and certify that the contamination has been removed or controlled to within legal requirements and Contractor will be notified to proceed with the work in writing.
- B. Noise Control: Perform all work in a manner and at times which will keep production of objectionable noise to a minimum amount of noise. Instruct all workers in noise control procedures. Noise that adversely affects adjacent properties will not be tolerated. Such conditions shall be the Owner's determination.
- C. Dust Control: Take appropriate action to check the spread of dust, and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as flooding or pollution. Comply with all dust regulations imposed by local air pollution agencies. Remove dust and dirt from work area at least daily or more frequently as needed or directed.
- D. Pest Control: Take appropriate measures to prevent the spread of pests and vermin from areas where work is being performed to other areas including the site and adjacent buildings.

#### 1.06 PROJECT SITE CONDITIONS

- A. The intent of the drawings is to show existing site and building conditions with information developed from the original construction documents, field surveys, and Owner's records, and to generally show the amount and types of demolition and removals required to prepare existing areas for new work. Contractor shall make a detailed survey of existing conditions pertaining to the work before commencing demolition.
- B. Extent: perform removals to extent required plus such additional removals as are necessary for completion even though not indicated or specified.

#### 1.07 PROTECTION

- A. Existing Work: Protect existing work which is to remain in place.
- B. Trees: Protect trees within the project site which might be damaged during demolition.

1.08 EXPLOSIVES: Use of explosives will not be permitted.

1.09 BURNING: Burning will not be permitted.

#### PART 2 – PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

- 3.01 EXAMINATION: Verify that utilities have been disconnected and capped.
- 3.02 PREPARATION: Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- 3.03 UTILITIES
- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.
  - B. Prior to demolition or in the event unrecorded utilities are encountered, notify Owner or serving utility companies, as applicable, for work necessary and scheduled to be performed. Coordinate responsibility for limits of utility removals and be responsible for the removal of all utility installations both above and below grade except for those installations the utility companies agree to remove. Use care to protect utility lines to remain in service, repair all damage which does occur, and remove those not to remain in service.
  - C. Interruption of Service: In the event existing utility service requires interruption to accomplish the demolition work, obtain written approval by the Owner for interruption of service. Request approval not less than 48 hours prior to proposed scheduled interruption. State the exact services involved and the expected duration. Except in an emergency affecting life and limb, do not cause any interruption of utility service without written authorization from the Owner.
  - D. Provide for protection of utility lines to remain in service. Repair damage done to these facilities as a result of the work of this section, to the satisfaction of the Owner. Locations of existing utilities to remain shall be identified on record drawings, and their physical location shall be indicated by tags or stakes as applicable.
- 3.04 WORKMANSHIP
- A. Partial demolition and removal: When portions of existing building are to remain, contractor shall protect portion of building to remain.
  - B. Contractor shall remove entire structure of building to be removed including but not limited to concrete foundations, wall and roof systems and all electrical and mechanical systems.
- 3.05 SALVAGE AND DISPOSAL
- A. General: Existing items Owner intends to retain will be designated by the Owner prior to start of work. Contractor shall carefully remove, salvage, box or bundle as approved, and deliver such items to storage as directed.
  - B. Disposal: All removed material other than items to be salvaged or reused shall become Contractor's property and be removed from Owner's property. Clean up and dispose of debris promptly and continuously as the work progresses, and do not allow to accumulate. Sprinkle water on the surface to prevent dust nuisance. Secure and pay for required hauling permits and pay dumping fees and charges.

END OF SECTION 02 41 16



SECTION 02 41 19 - SELECTIVE STRUCTURE DEMOLITION

1.1 GENERAL

- A. Scope of work: Complete all demolition work as shown on contract documents or as required to permit the installation of new construction, including but not limited to the following.
1. Remove interior partition walls as required to complete the work
  2. Remove electrical fixtures as required to complete the work
  3. Remove mechanical ductwork as required to complete the work
  4. Remove architectural finishes as required to complete the work
- B. Definitions: As follows:
1. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
  2. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.
  3. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.
  4. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.
- C. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.
- D. Record drawings at Project closeout according to Division 1 Section "Contract Closeout."
1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.
- E. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- F. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so that Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- G. Owner assumes no responsibility for actual condition of buildings to be selectively demolished.
- H. Storage or sale of removed items or materials on-site will not be permitted.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

- A. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.
- B. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- C. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- D. Utility Requirements: Locate, identify, shut off, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.
  - 1. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
- E. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
- F. Conduct demolition operations to prevent injury to people and damage to adjacent buildings, facilities, and site improvements to remain. Ensure safe passage of people around selective demolition area.
  - 1. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.
  - 2. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
  - 3. Cover and protect furniture, furnishings, and equipment that have not been removed.
- G. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- H. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.
- I. Demolish and remove existing construction only to the extent required by new construction and as indicated.
- J. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.
- K. Disposal: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
  - 1. Do not burn demolished materials.
  - 2. Transport demolished materials off Owner's property and legally dispose of them.
- L. Sweep the building broom clean on completion of selective demolition operation.

END OF SECTION 02 41 19

SECTION 02 41 31 SELECTIVE SITE DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.

Scope of work: Complete all demolition work as shown on contract documents or as required to permit the installation of new construction, including but not limited to the following

1. Remove existing site concrete and misc. site improvements.
2. Remove existing trees as required for completion of new construction.

1.02 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

- B. Record drawings at Project closeout according to Section 01 77 19 "Contract Closeout."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.03 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition work similar to that indicated for this project.

- B. Public Utilities: Give all required notices, pay fees and charges, and arrange for disconnection and removal of abandoned public utilities and meters.

- C. Photographic and Video Documentation: Refer to Section 01380. Before starting work of this section, provide one set of photographs and one video of existing conditions to be affected by the demolition work. Provide progress videos as the work of demolition progresses, at intervals as approved, illustrating substrates, connections, concealed conditions, preservation of historic construction, and other conditions which will benefit subsequent work.

1.04 DEFINITIONS: The following terms have the meanings indicated when used in this section and on related drawings.

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

#### 1.05 ENVIRONMENTAL CONDITIONS

- A. Hazardous Materials: Prior to starting work, obtain from the Owner certification that hazardous materials have been removed. In the event additional material which is suspected to be friable asbestos or other regulated hazardous material is encountered during the demolition work, the Contractor shall stop work in such areas and notify the Owner. The materials will be inspected and tested, if necessary, by the Owner. If the material is found to be friable asbestos or other hazardous material, the Owner will provide for its removal or encapsulation without delay at Owner's expense. After treatment the Owner will test and certify that the contamination has been removed or controlled to within legal requirements and Contractor will be notified to proceed with the work in writing.
- B. Noise Control: Perform all work in a manner and at times which will keep production of objectionable noise to a minimum amount of noise. Instruct all workers in noise control procedures. Noise that adversely affects adjacent properties will not be tolerated. Such conditions shall be the Owner's determination.
- C. Dust Control: Take appropriate action to check the spread of dust, and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as flooding or pollution. Comply with all dust regulations imposed by local air pollution agencies. Remove dust and dirt from work area at least daily or more frequently as needed or directed.
- D. Pest Control: Take appropriate measures to prevent the spread of pests and vermin from areas where work is being performed to other areas including the site and adjacent buildings.

#### 1.06 PROJECT SITE CONDITIONS

- A. The intent of the drawings is to show existing site and building conditions with information developed from the original construction documents, field surveys, and Owner's records, and to generally show the amount and types of demolition and removals required to prepare existing areas for new work. Contractor shall make a detailed survey of existing conditions pertaining to the work before commencing demolition.
- B. Extent: perform removals to extent required plus such additional removals as are necessary for completion even though not indicated or specified.

#### 1.07 PROTECTION

- A. Existing Work: Protect existing work which is to remain in place.
- B. Trees: Protect trees within the project site which might be damaged during demolition.

1.08 EXPLOSIVES: Use of explosives will not be permitted.

1.09 BURNING: Burning will not be permitted.

#### PART 2 – PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

- 3.01 EXAMINATION: Verify that utilities have been disconnected and capped.
- 3.02 PREPARATION: Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- 3.03 UTILITIES
- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.
  - B. Prior to demolition or in the event unrecorded utilities are encountered, notify Owner or serving utility companies, as applicable, for work necessary and scheduled to be performed. Coordinate responsibility for limits of utility removals and be responsible for the removal of all utility installations both above and below grade except for those installations the utility companies agree to remove. Use care to protect utility lines to remain in service, repair all damage which does occur, and remove those not to remain in service.
  - C. Interruption of Service: In the event existing utility service requires interruption to accomplish the demolition work, obtain written approval by the Owner for interruption of service. Request approval not less than 48 hours prior to proposed scheduled interruption. State the exact services involved and the expected duration. Except in an emergency affecting life and limb, do not cause any interruption of utility service without written authorization from the Owner.
  - D. Provide for protection of utility lines to remain in service. Repair damage done to these facilities as a result of the work of this section, to the satisfaction of the Owner. Locations of existing utilities to remain shall be identified on record drawings, and their physical location shall be indicated by tags or stakes as applicable.
- 3.04 WORKMANSHIP
- A. Partial demolition and removal: When portions of pavement, slabs, sidewalks, curbs, curb and gutters and cross-gutters are to be removed, cut with a concrete saw full depth along all joint lines. Provide additional saw cut 2" away from saw cut on joint line, on the demolition side. Provide double saw cut at all areas to be demolished. All saw cuts shall be full depth.
- 3.05 DEMOLITION OF SITE IMPROVEMENTS
- A. Site Improvements: Remove walks and pavement, including base courses and miscellaneous improvements.
  - B. Paving and Slabs: Remove asphaltic concrete paving and slabs including aggregate base as indicated.
  - C. Underground Utilities: Expose pipe and conduit and cap at property line with permanent waterproof plugs or seals of concrete or metal. Except for items indicated to be abandoned in place, remove on-site abandoned pipe and conduit, cap and seal remaining pipe or conduit ends, and backfill the excavations as specified for new construction.
- 3.06 SALVAGE AND DISPOSAL

- A. General: Existing items Owner intends to retain will be designated by the Owner prior to start of work. Contractor shall carefully remove, salvage, box or bundle as approved, and deliver such items to storage as directed.
- B. Disposal: All removed material other than items to be salvaged or reused shall become Contractor's property and be removed from Owner's property. Clean up and dispose of debris promptly and continuously as the work progresses, and do not allow to accumulate. Sprinkle water on the surface to prevent dust nuisance. Secure and pay for required hauling permits and pay dumping fees and charges.

END OF SECTION 02 41 31



## Asbestos Abatement Plan

### Imperial Valley College – Buildings 200, 300, 800

2/10/2020

#### Western Environmental & Safety Technologies LLC (WEST)

7676 Hazard Center Drive Suite #5000, San Diego, California, 92108

Phone: (858) 271-1842 • fax: (858) 271-1856 • email: gowestdc@msn.com

*Point of Contact for Western Environmental & Safety Technologies LLC:*

#### David Christy, CAC

Senior Partner - WEST

State of California Certified CAC# 92-0703

CDPH Certified Lead Supervisor - S-5463

☎ Tel: (858) 271-1842 (office)

☎ Tel: (619) 571-3987 (cell)

### General Project Information

**Owner:** Imperial Valley College, 380 East Aten Road, Imperial, California 92251

**Project Point of Contact:** Jimmy Sanders, Sanders Inc. (760) 353-5440

**Areas of Construction:** Buildings 200, 300, 800

### General Scope of Work Information

This plan has been specifically designed for the removal of asbestos materials (ACM, ACBM, ACCM). This plan will be followed for asbestos abatement needs for building materials that will be impacted by the Imperial Valley College – Buildings 200, 300, 800 modernization / upgrade project. The abatement contractor is to field verify all conditions and quantities of the asbestos containing building materials that are outlined for removal.

### Asbestos Materials – Known and Assumed

#### **Known:**

**Asbestos Floor tile:** 5% - 8% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (some asbestos tile is exposed, the majority is located under newer floor tile and carpet.

**Asbestos Flooring Mastics:** 3% - 4% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (located under all 9x9 floor tile, and also under newer floor tile and carpet.

**Asbestos Tank Insulation (small tank above HVAC units – located in all mechanical rooms)** 50% - 60% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (all mechanical rooms)

**Assumed Asbestos:** Fire Doors – Contractor check all doors from the buildings and verify any asbestos insulations.

**Assumed Asbestos:** Pipe Insulation (concealed within walls, ceilings, and chase cavities)

**Assumed Asbestos:** All materials not sampled within the asbestos & lead paint sampling report completed by WEST 12/16/19.



**The contractor will submit a proper 10-day NESHAP regulatory notification (asbestos removal) for this project.**

**References**

- American National Standards Institute (ANSI)
- ANSI Z9.2 1979 (R1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
- ANSI Z88.2 1992 Respiratory Protection
- ASTM D 1331 Surface and Interfacial Tensions of Solutions of Surface-Active Agents
- ASTM E 1368 Visual Inspection of Asbestos Abatement Projects

**Code of Federal Regulations (CFR)**

- 29 CFR 1926.103 Respiratory Protection
- 29 CFR 1926.51 Sanitation
- 29 CFR 1926.200 Accident Prevention Signs and Tags
- 29 CFR 1926.33 Access to Medical Records
- 29 CFR 1926.59 Hazard Communication
- 29 CFR 1926.1101 Asbestos
- 40 CFR 61-SUBPART A General Provisions
- 40 CFR 61-SUBPART M National Emission Standard for Asbestos
- 40 CFR 763 Asbestos Containing Material in Schools
- Underwriters Laboratories Inc. UL 586 1990 High-Efficiency Particulate Air
- EPA 560/5-85-024 Guidance For Controlling Asbestos Containing Materials in Buildings

California Code of Regulations, Title 8, General Industry Safety Orders - Cal OSHA requirements for Contractors performing asbestos removal.

**Definitions of Asbestos**

Different regulatory agencies and different regulations contain different definitions for a material that contains asbestos. The definitions are similar but different based upon the context in which the definition was created. The following are common definitions found in asbestos regulations.

**Asbestos Containing Material (ACM):**

According to EPA, OSHA and Cal-OSHA, asbestos containing material is a material that has greater than 1% asbestos.

**Asbestos Containing Building Material (ACBM):**

For purposes of AHERA, material with greater than 1 % asbestos that was used on the interior construction of a school is called asbestos containing building material (ACBM).

**Asbestos Containing Construction Material (ACCM):**

According to Title 8, Section 1529, asbestos containing construction material means any manufactured construction material which contains more than 0.1 % asbestos by weight.

**Presumed Asbestos Containing Material (PACM):**

Any thermal system insulation and surfacing material found in buildings constructed no later than 1980. The designation of a material as PACM may be rebutted pursuant to Title 8, section 1529, subsection (k)(5).

**Regulated Asbestos Containing Material (RACM):**

The EPA in the National Emission Standard for Hazardous Air Pollutants (NESHAP) defines RACM as (a) Friable asbestos containing material, (b) Category I non-friable asbestos containing material that has become friable, (c) Category I non-friable asbestos containing material that will be or has been subjected to sanding, grinding, cutting or abrading, or (d) Category II non-friable asbestos containing material that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by Subpart M.

**General Safety Plan**

The asbestos removal contractor will comply with the general safety procedures that are already in place by the owner and/or general contractor.

**Contractor Certification Requirements**

The contractor performing the abatement will be certified through State of California D.O.S.H. and will also hold a Contractors State License Certification for Asbestos (ASB). All employees of the contractor will be AHERA certified asbestos removal workers, under the full time on-site direction of an AHERA certified asbestos removal supervisor. The on-site certified supervisor will have a minimum of 2 years practical experience. The contractor will adhere to and maintain all other local, state and federal requirements regarding licensing, certifications, and removal practices.





### General Schedule of Work

**The contractor shall conduct all asbestos removal during owner approved hours Monday – Friday, and will complete the asbestos removal as outlined within this work plan as stipulated by the owner.** The work that is taking place will be properly signed and barricaded at a safe distance from other trades and district staff so to avoid interfacing conflicts. This is further outlined in the plan with area set up information, asbestos warning signs, and air sampling. No other trades will be permitted to enter the asbestos control areas until they are released by WEST.

#### Prior to commencement of work:

As required, notification in writing of proposed asbestos work, with copy to the Owner, the EPA Regional Office, OSHA or OSHA Regional Office, local air pollution agency, and local authority with responsibility for enforcement of occupational health and safety regulations and enforcement of NESHAP regulation and with jurisdiction within the State of California.

### Abatement Contractor Submittals

#### PRE-START MEETING SUBMITTALS

Submit to the owner a minimum of 10 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project:

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements, asbestos removal procedures, asbestos disposal procedures.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, medical releases, respirator fit test's, as appropriate.
- C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the contractor's competent person.
- D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
  1. Negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
  2. Waste water filtration system, shower system, containment barriers.
  3. Encapsulants, surfactants, hand held sprayers, airless sprayers, and fire extinguishers.
  4. Respirators, protective clothing, personal protective equipment.
  5. Fire safety equipment to be used in the regulated area.
  6. Fall protection program, training, and equipment.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
  1. Asbestos Abatement Company: Project experience within the past 3 years (6 projects); listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; and Completion Date
  2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution



3. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the contractor's competent person stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
    1. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
    2. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
      - a) Contractor and all supervisors shall have completed a four-day, EPA approved training course.
      - b) Asbestos abatement workers shall have completed a three-day, EPA approved training course.
      - c) All training, medical examinations, and respirator fit-testing shall conform to 8 CAL CODE OF REGULATIONS 5208 as well as 40 CFR, Part 763, Appendix C to Subpart E as applicable.
      - d) Submit documentation to the Owner that sixty (60) percent of the work force (exclusive of job foremen, superintendents, etc.) have at least one year's experience in asbestos abatement work.
      - e) Submit documentation to the Owner that sixty (60) percent of the project foremen, superintendents have had at least two year's experience in asbestos abatement work.
  - J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IH's familiar with your asbestos removal work activities.
  - K. Rented equipment must be decontaminated prior to returning to the rental agency.
  - L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS, and application instructions.

**Submittal Review & Approval Process**

- A. Deliver to the owner two (2) original copies of submittal.
- B. All submittals shall be submitted in hard-cover, three-ring, loose leaf binders, properly indexed with tabs separating each section.
- C. Comply with progress schedule for a timely submission of submittals as they relate to work progress. Coordinate submittal of related items.
- D. Contractor shall review, sign and approve submittals, with notes required for his approval, prior to submittal to Consultant.
- E. After Consultant's review of submittals, revise and resubmit if required.
- F. Distribute copies of reviewed submittals to appropriate sub-trades and/or suppliers.



**Submittals Required During Asbestos Abatement**

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results (personal samples). Submit this information daily to the owners IH.
- B. The contractor’s competent person shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.
  - 1. Removal of any poly barriers.
  - 2. Visual inspection/testing by the IH prior to application of lockdown encapsulant.
  - 3. Packaging and removal of asbestos waste from regulated area.
  - 4. Disposal of friable ACBM, PACM and ACM waste materials; copies of Waste Shipment Records/landfill receipts to the owner’s representative on a weekly basis.

**Submittals Required at Completion of Abatement**

- A. The contractor’s competent person shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It will also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion. All personnel samples must be submitted.

## Asbestos Removal Procedures

**Known:**

**Asbestos Floor tile:** 5% - 8% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (some asbestos tile is exposed, the majority is located under newer floor tile and carpet.

**Asbestos Flooring Mastics:** 3% - 4% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (located under all 9x9 floor tile, and also under newer floor tile and carpet.

**Asbestos Tank Insulation (small tank above HVAC units – located in all mechanical rooms)** 50% - 60% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (all mechanical rooms)

**Assumed Asbestos:** Fire Doors – Contractor check all doors from the buildings to verify any asbestos insulations.

**Assumed Asbestos:** Pipe Insulation (concealed within walls, ceilings, and chase cavities)

**Assumed Asbestos:** All materials not sampled within the asbestos & lead paint sampling report completed by WEST 12/16/19.

**General Utility Services Available**

- Water - Existing service is available for the Contractor's use.
- Electrical Service - Existing service is available for the Contractor's use.

**Asbestos Abatement – Preparation of Work Area**

**Preparation of Work Area**

When and where required, provide temporary power and lighting and ensure safe installation of temporary power source and equipment per applicable electrical code requirements and provide safety lighting and ground fault circuit interrupter (GFCI) as power source for electrical equipment.



## **Asbestos Floor Tile and Asbestos Mastic Removal (ACM)**

**Asbestos Floor tile:** 5% - 8% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (some asbestos tile is exposed, the majority is located under newer floor tile and carpet.

**Asbestos Flooring Mastics:** 3% - 4% Chrysotile Asbestos.

Located in buildings 200, 300, 800 (located under all 9x9 floor tile, and also under newer floor tile and carpet.

**The contractor is to follow all OSHA guidelines as it relates to this material including but not limited to California Code of Regulations, Title 8, Section 1529.**

**The asbestos floor mastic removal will be conducted by a DOSH certified contractor.**

Asbestos floor tile and floor tile mastic is expected to be under the existing top layer of floor tile, under carpet, cabinets, bookshelves, case work and any other fixed object that conceals floor space within the building listed in this specification. The asbestos flooring will be removed from under all fixed objects. The removal of any and all fixed objects that becomes necessary during the asbestos flooring removal to expose all asbestos flooring materials at the owner's request will be completed at the removal contractors' expense. The removed fixed objects and debris will be stored in an approved area as designated by the owner.

All layers of flooring (floor tile, carpet, and floor mastic) will be removed and disposed of asbestos containing. Contractor is required to remove any and all layers of flooring encountered during this project as asbestos containing. It is anticipated that there will be multiple layers of flooring to be removed as part of this project. The contractor is to field verify the number of layers of floor tile, floor tile mastic, carpet, carpet mastic, floor glues and floor adhesives to be removed prior to bid submittal. **No additional time or financial compensation will be provided by the owner to the abatement contractor based on the number of flooring layers encountered.**

For removal of the asbestos floor tile and mastic, block and seal openings where the release of airborne asbestos fibers can be expected. Seal off all openings including but not limited to windows, doors, duct openings, air vents, and any other penetrations to the work areas with 2 overlapping layers of 6 mil polyethylene sealed with duct tape. Install full walls with 1 layer of 6 mil polyethylene sealed with duct tape. Provide a 3-stage decontamination unit, contiguous to the work area (see decontamination enclosure system in this work plan for details).

The material will be removed wet (following the NESHAP Adequately Wet Guidance Manual) using non-motorized manual labor heavy bars and single bagged in 6-mil clear bags while within the containment area. The waste will be loaded out to the waste load out area and it will be placed within a second disposal bag, and then loaded through the waste load and placed into a lined and signed and locked disposal dumpster prior to the end of each daily shift. The non friable waste stream generated by the carpet and floor tile removal will be disposed of at an approved landfill.

After the tile has been removed from containment, mastic will be removed utilizing a chemical removal process adhering to the local APCD floor mastic removal compliance rules for type of approved solvents, licensing, and daily usage requirements. The mastic material will be removed wet using the pre-approved mastic removal solvent and single bagged in 6-mil asbestos labeled bags while within the containment area for waste disposal. The waste will be loaded out to the waste load out area and it will be placed within a second labeled disposal bag. The double bagged mastic waste will then be loaded through the waste load out area and placed into a lined, signed and locked disposal dumpster prior to the end of each daily shift. The mastic waste will be properly disposed of according to the removal methodology used. (RACM disposal for mechanical means, non-RACM disposal if removed by hand) The friable and non-friable waste streams generated from this project will be properly segregated for on-site storage and disposal. All work areas will be properly marked and signed with asbestos caution tape and bilingual warning signs conforming with 29 CFR 1926.200 & 29 CFR 1926.1101. The asbestos control areas will be located 10' from all asbestos removal.



**Asbestos Tank Insulation located in Mechanical rooms (RACM)**

**Asbestos Tank Insulation (small tank above HVAC units – located in all mechanical rooms)** 50% - 60% Chrysotile Asbestos.  
 Located in buildings 200, 300, 800 (all mechanical rooms)

As needed for asbestos removal, demarcate entire perimeter of the removal area a minimum of 15 feet using asbestos warning tape, delineators, and signs. Construct an enclosure capable of containing and sealing the mechanical rooms that has been outlined for removal within a controlled space. Removal work areas will be isolated constructing full containments including covering all ceilings, wall barriers, and 2 floors of 6 mil poly attached to the constructed poly walls, negative air, and a three stage de-con. Ensure that fall protection is in place per fall protection guidelines as established by CAL/OSHA and FED/OSHA. Wet materials continually with amended water solution to prevent excessive fiber release. Provide a 3-stage decontamination unit, contiguous to the work area (see decontamination enclosure system in this work plan for details). All material will be removed using wet methods, using non-motorized hand tools. The material will be double bagged in labeled asbestos waste disposal bags will still located inside the containment. The waste bags will be wet wiped down and loaded out of the containment, and placed in a signed and lined waste disposal dumpster capable of being locked. The RACM waste will be disposed of by an EPA approved landfill that accepts friable asbestos waste. Wet clean and HEPA vacuum the cleaned tank boiler pieces once all gross removal and detail cleanup has taken place prior to the final wet wiping. Encapsulate the asbestos removal work areas upon a passing visual inspection by WEST, prior to the final air clearance sampling. All work areas will be properly marked and signed with asbestos caution tape and bilingual warning signs conforming with 29 CFR 1926.200 & 29 CFR 1926.1101.

**Assumed Asbestos Fire Door Insulation (Contractor to check all doors)**

**Fire Door Insulations Assumed: All Buildings**

**The asbestos fire door removal will be conducted by a DOSH certified contractor.**

The contractor will remove door hardware on all doors for the buildings under contract as part of this project. The owner’s representative will inspect all doors for the presence of asbestos door insulation prior to removal and disposal of all doors once the doors are exposed. All doors are to be assumed to be asbestos insulated until released by the owner’s representative as non-asbestos insulated. As needed, remove asbestos insulated fire doors following this specification. Demarcate entire perimeter of the area a minimum of 10 feet from the base of the structure using asbestos warning tape, delineators, and signs. Place a six-mil poly drop cloth at the base of the door being removed. Remove all asbestos insulated fire doors from the door hinges being careful to not damage the fire door. The door hardware will be removed also using care to not disturb in asbestos insulation found within the fire doors. Store all door hard ware as directed. The fire doors will be “burrito wrapped” in six mil poly, place asbestos warning stickers on the wrapped doors, and place the wrapped doors within a lined asbestos disposal dumpster. Waste will be disposed of as friable asbestos waste. The friable waste will be disposed of at an EPA approved landfill that accepts friable asbestos waste (RACM). All work areas will be properly marked and signed with asbestos caution tape and bilingual warning signs conforming with 29 CFR 1926.200 & 29 CFR 1926.1101. The asbestos control areas will be located 10’ from all asbestos removal.

**Asbestos Removal Operations – Thermal System Insulation (Pipe Insulation)**

**The asbestos fire door removal will be conducted by a DOSH certified contractor.**

It is anticipated that asbestos thermal system insulation will be encountered during this project and removal of the material will become necessary. As needed, remove pipe insulation discovered within wall and ceiling areas following this specification. Place a single layer of 6 mil polyethylene sheeting on the floor directly beneath the area and extending a minimum of 10 feet in all directions. Completely wrap the pipe insulation in a glove bag and remove using a glove bag technique. All pipe insulation material will be single bagged since they will be already wrapped in the poly glove bag and disposed of as friable asbestos waste. All work areas will be properly marked and signed with asbestos caution tape and bilingual warning signs conforming with 29 CFR 1926.200 & 29 CFR 1926.1101.

**Glovebag Removal Systems - General work practices**

1. Glovebags shall be made of 6-mil thick plastic and shall be seamless at the bottom.
2. Each shall be installed so that it completely seals to the wall where the removal cut will need to take place.
3. Glovebags shall be smoke-tested for leaks and any leaks sealed prior to use.
4. Glovebags may be used only once and may not be moved.
5. Prior to disposal, removing air within glovebags using a HEPA vacuum shall be performed to collapse glovebags.
6. At least two persons shall perform the glovebag removals.

**Daily site view and clean-up procedures - Asbestos Removal Operations**

Each day, at the end of each shift during this project, the asbestos removal contractor will conduct a site review and clean-up of all interior and exterior work areas of the project site. This will include work areas for all of the on-site trades providing on-site services near or around the asbestos containing materials as listed within this specification. Any asbestos building material debris as called out within this specification that is encountered during the end of shift walkthrough will be promptly cleaned using wet methods and thoroughly HEPA vacuumed. WEST will be notified by the asbestos abatement contractor's on-site competent person (supervisor) on a daily basis of any asbestos debris encountered and cleaned.

**Personnel Decontamination Facility (PDF)**

**(Three stage - PDF)**

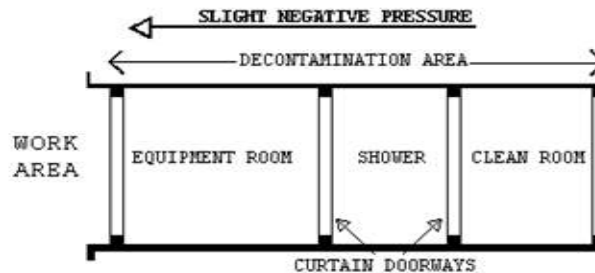
**Required for exterior wall stucco removal, Floor Tile and Mastic removal**

1. **Clean Room:** The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque poly to provide an air tight room. Provide a minimum of a 3 foot wide 6 mil poly opaque doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, minimum 10 pounds capacity, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room in nylon shorts and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. **Shower Room:** The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
3. **Equipment Room:** The contractor shall provide an equipment room which shall be an air tight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated



area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.

4. The PDF shall be as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF shall be a minimum of 2 layers of 6 mil opaque poly.



### Requirements Prior to Commencement of Abatement

- Submittals are submitted and approved. Including an asbestos removal work plan submitted by the abatement contractor.
- Arrangements have been made for disposal of all asbestos waste at an acceptable site approved for asbestos waste. (Both friable and non-friable asbestos waste generated from this project)
- Notification has been made to the proper regulatory agencies as required. (APCD, OSHA)
- Arrangement have been made for containing, filtering, and/or disposal of wastewater resulting from showering and other abatement activities such as bag wash down and containment wall / floor washing.
- Work areas and decontamination enclosure systems are effectively segregated.
- Leak test has been conducted on dumpster or container.
- Tools, equipment and material waste receptacles are on site.
- All other preparatory steps have been taken and applicable notices posted, and permits obtained as required.
- A visitor and employee log in/log out system is in place at the job site. All persons entering the site will be required to sign in and sign out. All employees and visitors must present evidence of respirator training and fit testing along with a physician's approval to wear the respirator prior to entry into any restricted abatement area.

### Asbestos Abatement: Order of Operations

Work shall progress in the following order of operations:

- Site preparation as described above.
- Continually spray material with a wetting agent
- Removal of all asbestos materials as outlined
- Double bag or wrap all asbestos waste in 2 disposal bags or 2 layers of six mil poly.
- Wet clean / wash down all areas were the asbestos materials were removed.
- Wet clean all containment poly used in the set up of the asbestos removal areas.
- HEPA vacuum all areas were the asbestos materials were removed.
- Visual inspection by 3<sup>rd</sup> party
- Collection of Final Clearance Samples (collected by 3<sup>rd</sup> party)
- Remove polyethylene sheeting where applicable. (upon passing visual and final air clearance)
- Clean up site.
- Waste disposal



**Abatement Procedures / Environmental Control**

Spray the asbestos materials with a mist of a wetting agent using spray equipment capable of providing a low-pressure application to reduce the release of fibers while in the asbestos removal area. Saturate the material sufficiently to wet it to the substrate without causing excess drippings prior to the removal.

Ensure all abatement activities are conducted in accordance with all local, regional, state and federal rules, regulations and directives (i.e., Environmental Protection Agency [EPA], Occupational Safety and Health Administration [OSHA], and California OSHA [Cal/OSHA]).

Remove the saturated asbestos material within the work areas. Double wrap all disposal bags and glove bags with second container or bag for transport. Material shall not be allowed to dry out prior to double bagging and placing in the disposal dumpster.

Adhere to disposal authorities' size and weight requirements for containers (bags or packages).

All asbestos waste and contaminated material which has been bagged or wrapped in the work areas cannot be allowed to accumulate; all bagged or wrapped material must be placed in the dumpster or removed off site daily.

Bagged or wrapped material will be removed to waste bag-out area separate from the actual removal but still within the asbestos control / boundried area. Re-bag or re-wrap all material in a second 6-mil poly bag. Clean external surfaces of bags by wet sponging and place caution labels on containers in accordance with OSHA regulations 29 CFR 1926.1101.

**Respiratory Protection**

Provide workers with clean and properly maintained respiratory equipment approved by the National Institute of Occupational Safety & Health (NIOSH) and the Mine Safety & Health Administration (MSHA) as specified in 29 CFR 1910.134. If personal and area fiber levels are below 0.1 fiber/cc, air-purifying respirators equipped with HEPA filters may be employed. When employed, the Contractor shall provide a sufficient quantity of filters during the workday. The respirator filters shall be stored at the job site in the change room and shall be totally protected from exposure to asbestos prior to their use.

Single-use or disposable respirators will not be permitted. The contractor may start work in a North 7700 series, half-face negative pressure respirator equipped with a HEPA filter. This is based on numerous other asbestos removal projects with similar scopes of work where a satisfactory protection was achieved.

**Protective Clothing**

Provide workers with sufficient sets of protective full body clothing. Such clothing shall consist of full body coveralls and headgear. Provide eye protection and hard hats as required by applicable safety regulations. Non-disposable type protective footwear shall be left in the contaminated equipment room / regulated area until the end of the asbestos abatement work, at which time such items shall be disposed of as asbestos waste, or shall be thoroughly cleaned of all asbestos containing material. Disposable type protective clothing, headgear and footwear may be used and shall be disposed of as asbestos waste. Bare feet will not be permitted. Provide authorized visitors with suitable protective clothing, headgear, eye protection and footwear whenever they are required to enter work areas. A double suit method will be utilized since the removal areas are 1 square foot and a shower system will not be in place.

**Worker Protection Procedures**

Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbances of asbestos containing or contaminated materials and until final clean-up is completed. This includes removal of fixtures, ceilings, or anything else which may disturb the asbestos.

Remove street clothes, put on a respirator and clean protective clothing before entering the work area.





Before entering the work area from outside the regulated spaces, each worker and authorized visitors shall put on a clean respirator with filters (where required) and dress in clean protective clothing as described in this specification.

Workers shall not eat, drink, smoke or chew gum or tobacco, or utilize sanitary (toilet) facilities at the work site except in established locations **outside** the regulated work areas, and enclosures. Provide and post, the decontamination and work procedures to be followed by workers as described in these specifications.

**Environmental, Safety and Health Compliance**

Comply with all applicable laws, rules, and regulations of local, state, and federal, authorities regarding handling, storing, transporting and disposing of asbestos waste materials.

**Fire and Emergency Response Plan**

The contractor will follow and adhere to the Fire and Emergency Response Plan as already employed by the owner. The on-site abatement supervisor to all abatement workers will discuss this during the start-up tailgate safety meeting.

**Lock Out – Tag Out**

If needed, establish a program consisting of energy control procedures, employee training on the job site to discuss job specific hazards. When the asbestos removal poses a safety risk in relationship to any energized power source, the power will be isolated and locked out by use of a physical devise that will be unable to be removed by any unknown party. If an energy source is not capable of being locked out then incorporate a tag-out system. If a tag-out device is used on an energy isolation device which is capable of being locked out, the tag out device shall be attached at the same location that the lock out device would have been attached.

**Fall Protection**

Engage a fall protection plan / program for the work associated with roofs, ladders, and high reach equipment use which poses a fall safety hazard. The plan shall be enforced by the on-site supervisor in charge of the project. A preconstruction safety meeting will be conducted by the on site supervisor and all on site employees to review specific job hazards.

**Air Monitoring**

Throughout the removal and subsequent cleaning operations, ambient (area) monitoring will be conducted by WEST as a third party consultant (California Certified Asbestos Consultant - CAC) Upon completion of all asbestos removal and site cleanup, post asbestos removal final air clearance sampling will be collected from the interior spaces by WEST. All personal air samples collected by the contractor will be analyzed by the laboratory of the contractor’s choice, which has been pre-approved by the third-party CAC. The contractor’s personal air samples will be analyzed at the contractor’s expense.

Throughout the removal and subsequent cleaning operation, personal air monitoring shall be conducted by the contractor. Personal breathing zone samples shall be collected on a representative number of abatement employees daily to determine their 8-hour time weighted average (TWA) exposure to asbestos fibers in addition to one 30-minute sample each work shift to determine if the excursion limit (EL) of 1.0 f/cc is exceeded. Such samples shall be taken in order to establish an 8-hour TWA for each type of employee operation. Personal samples shall be collected at least every four hours. Analytical results of personal air samples will be available in order to supplement

ambient air monitoring data. Analytical results will be available on a 24-hour turnaround basis, at pump shut off. The microscopist responsible for asbestos analysis has taken the NIOSH 582 course or equivalent, Sampling and Evaluating Airborne Asbestos Dust, which includes instruction on the NIOSH 7400 procedures.

**ALL air monitoring results provided to WEST shall include as a minimum for each sample the following:**

- Sample ID
- Filter area (in mm<sup>2</sup>),
- Graticule field area (in mm<sup>2</sup>)
- Fibers/cc
- Location
- Name of analyst
- Laboratory ID
- Flow (in liters/minute)
- Average count (fibers/field)
- Date sample was analyzed
- Type of activity & employee's name
- Date sample taken
- Time (in minutes)
- Blank count (fibers/field)
- Detection limit for each sample (fibers/cc)

Analysis shall be conducted according to 29 CFR 1910.1101, Appendices A and B which describe the OSHA Reference Method and which utilizes the acetone/triacetin sample preparation (or equal) procedures and a phase contrast microscope fitted with the Walton-Beckett eyepiece graticule.

No other trades or unauthorized personnel will access the regulated areas until the area has been release by WEST.

The minimum amount of air samples collected per work area by the contractor will be:  
 1 30-minute STEL sample per day / 1 personal sample per 4 employees per day (per activity)

**Disposal – General Requirements**

**The following waste generated from this project will be disposed of as RACM (friable):**

- Asbestos Flooring Mastics:** 3% - 4% Chrysotile Asbestos.  
 Located in buildings 200, 300, 800 (located under all 9x9 floor tile, and also under newer floor tile and carpet. (based on mechanical / motorized removal process)
- Asbestos Tank Insulation (small tank above HVAC units – located in all mechanical rooms)** 50% - 60% Chrysotile Asbestos.  
 Located in buildings 200, 300, 800 (all mechanical rooms)
- Assumed Asbestos:** Fire Doors
- Assumed Asbestos:** Pipe Insulation

**The following waste generated from this project will be disposed of as non-friable / non-RACM:**

- Asbestos Floor tile:** 5% - 8% Chrysotile Asbestos.  
 Located in buildings 200, 300, 800 (some asbestos tile is exposed, the majority is located under newer floor tile and carpet.

Dispose of asbestos waste at an approved disposal site in accordance with the requirements of the disposal authority. Submit document citation (manifests) regarding disposal to WEST. All disposal dumpsters used will be properly signed and placard while in use. The RACM and Non-RACM waste will be carefully segregated for site storage, manifesting, transport, and disposal purposes. The Friable ACBM / RACM and associated waste generated from this project will be disposed of as friable waste. Friable ACBM / Friable RACM waste, contaminated water, waste debris, bags, must be double bagged or double wrapped in 6 mil polyethylene plastic, printed owner labels attached, and properly goose neck taped and sealed, with a uniform hazardous waste manifest signed and approved by the owner. All asbestos waste generated from this project must be damp when delivered to the disposal site.

A waste disposal dumpster or any EPA approved hazardous waste container system capable of being totally secured can be used for transport to the disposal site. All loads are to be delivered in an enclosed vehicle. Each load must be accompanied by a Uniform Hazardous Waste Manifest. Copies of the Hazardous Waste Manifest shall be provided to the Owner. All local, state, and federal requirements regarding disposal will be followed. Prior to disposal, the contractor shall supply all disposal information to the owner for approval. This includes the means of disposal, waste hauler, waste hauler credentials, storage facility to be used, storage facilities credentials, the landfill to be used, and the landfills credentials.

*Prepared By:*



**David Christy**

Certified Asbestos Consultant - CAC# 92-0703

Sr. Partner - WEST

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2/10/2020

**PCB’s / Mercury Containing Light Tubes / Universal Waste  
Handling, Removing, and Disposal Plan**  
**Imperial Valley College – Buildings 200, 300, 800**

**2/10/2020**

**Western Environmental & Safety Technologies LLC (WEST)**  
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State of California Certified CAC# 92-0703  
CDPH Certified Lead Supervisor - S-5463  
☎ Tel: (858) 271-1842 (office)  
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**General Project Information**

**Owner:** Imperial Valley College, 380 East Aten Road, Imperial, California 92251

**Project Point of Contact:** Jimmy Sanders, Sanders Inc. (760) 353-5440

**Areas of Construction:** Buildings 200, 300, 800

**Scope of Work**

This work plan addresses the handling, removing and disposing of the following materials including but limited to:

1. Polychlorinated Biphenyls (PCBs) containing materials in electrical ballasts
2. Mercury containing light tubes
3. General universal waste

This work plan will be put in place if any construction activities involving disturbance to existing lighting structures, ballasts, batteries, and general universal waste is anticipate associated with this project. The removal, hauling, and disposal of the referenced materials and all associated activities to complete the project as listed will be conducted at the contractor’s expense. All remaining hazardous/regulated materials are to be properly removed, transported, recycled, and/or disposed in accordance with all applicable regulations (local, state, and federal) and these specifications.

**Definitions**

Definitions are those contained in 40 CFR 761

**Notifications**

The project owner and the on-site inspector shall be given a courtesy notification seventy-two (72) hours prior to start of any related work outlined within this specification / work plan.

**References**

Code of Federal Regulations (CFR)	
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.145	Accident Prevention Signs and Tags
29 CFR 1910.1000	Air Contaminants
29 CFR 1926.59	Hazard Communication
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in commerce, and Use Prohibitions
40 CFR 171	General Information, Regulations, and Definitions
40 CFR 172	Hazardous Materials Tables and Hazardous Materials Communications Regulations
40 CFR 173	Shipments and Packing
40 CFR 174	Carriage by Rail
40 CFR 175	Carriage by Aircraft
40 CFR 176	Carriage by Vessel
40 CFR 177	Carriage by Public Highway
40 CFR 178	Shipping Container Specification
40 CFR 179	Tank Cars

**Submittals**

The Consultant's review of submittals shall not relieve the Contractor from the responsibility for complying with contract drawings or specifications unless the Contractor has secured the written approval of the Consultant for all deviations. Consultant's review of submittals shall not relieve the Contractor from responsibility for errors and omissions in the submittals.

Submittals shall contain only those items specified and shall not include items which are not provided for under this contract unless they are clearly marked and/or voided as not being part of this contract. The submittals that are required are as follows:

**Prior to commencement of work:**

As required, notification in writing of proposed work, with copy to the Owner, the EPA Regional Office, OSHA or OSHA Regional Office, local air pollution agency, and local authority with responsibility for enforcement of occupational health and safety regulations and enforcement of any environmental regulations with jurisdiction in the state in which this project is located.

Submit proof satisfactory to the Owner that all required permits, site locations and arrangements for transport and disposal of PCB containing materials, mercury filled light tubes, universal waste, and general waste and debris have been obtained.

Submit to the Owner for information and approval, a description of the plans for construction of decontamination enclosure systems and for isolation of the work areas in compliance with this specification and applicable regulations.

Submit documentation to the Owner indicating that all employees have had medical examinations and instruction on the hazards of PCB exposure, use of protective clothing, respirator fit tests, entry and exit from work areas, on work procedures and protective measures.

All training, medical examinations, and respirator fit-testing shall conform to 8 CAL CODE OF REGULATIONS 5208 as well as 40 CFR, Part 763, Appendix C to Subpart E as applicable.

Submit documentation to the Owner that sixty (60) percent of the work force (exclusive of job foremen, superintendents, etc.) have at least one year's experience in this type of work.

Submit documentation to the Owner that sixty (60) percent of the project foremen, superintendents have had at least two year's experience in this type of work.

The Contractor shall submit to the Owner, including but not limited to the following:

- A. Weekly work schedule.
- B. Various manufacturers information, including MSDS.
- C. Type and brands of materials for worker protection.
- D. Method of application and materials to be used.
- E. Medical exam results of all employees (OSHA 1910.1001), including chest roentgenogram, pulmonary function and forced expiratory volume at second (Contractor is responsible for the appropriate medical releases).
- F. Test results (both personal air monitoring data and air pressure differential between work areas and external air).
- G. Copies of all daily manpower and work logs indications area(s) and type of work performed.
- H. Copies of all certifications of disposal.
- I. Copies of permits.
- J. Copies of all OSHA Form 101 or equivalent accident/injury/incident reports.

### **Fall Protection**

Scaffolds and man lifts shall be equipped with guardrails and workers provided with the proper fall protection equipment.

Freestanding scaffolds shall not extend higher than four (4) times the minimum base dimension. Guardrails, toe boards, and outriggers shall be installed on scaffolds more than six feet in height. Planks shall extend no more than 12 inches past the end support. Use of ladders and scaffolding shall be in accordance with established standards.

Only approved ladders shall be used inside the regulated areas. No ladder shall be placed directly on areas lined with polyethylene.

The contractor shall supply for approval a written fall protection safety plan.

### **Hazard Communications**

The contractor shall supply for approval a written ongoing hazard communication program. Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) will always be kept on the job site for all items as required.

### **Respirator Protection Program**

The Contractor shall supply for approval a written respiratory Protection Program.

### **Submittal Procedures**

Deliver to the Owner point of contact two (2) copies of the submittal.

All submittals shall be submitted in hard-cover, three-ring, loose leaf binders, properly indexed with tabs separating each section.

Comply with progress schedule for a timely submission of submittals as they relate to work progress. Coordinate submittal of related items.

Contractor shall review, sign and approve submittals, with notes required for his approval, prior to submittal to Consultant.

After Consultant's review of submittals, revise and resubmit if required. Distribute copies of reviewed submittals to

appropriate sub-trades and/or suppliers.

### **Emergency Procedures**

All personnel shall be briefed that the single emergency telephone number is 911.

#### **Fire:**

In the event of a fire, all personnel shall evacuate the area and call the fire department. Personnel shall be briefed to assemble at an on-site designated area. The onsite Competent person shall be responsible for accounting for all employees. There shall be two exits designated from the work area.

#### **Medical:**

There shall be a minimum of two employees on site with first aid and CPR training to handle: Life Threatening Injury: In the event of a life threatening injury, the injured party shall be removed from the work areas as expeditiously as possible. 911 shall be called to request medical assistance. The injured party removed and decontaminated as much as possible outside. Responding medical personnel shall be advised that the injured may be contaminated with PCB material as appropriate.

#### **Non-Life Threatening Injury:**

In the event of a minor non-life threatening injury, the injured party shall exit through the decontamination unit following the proper exit decontamination procedures and proceed to medical assistance.

#### **Heat Stress/Heat Stroke:**

Heat stress and heat stroke are not expected to be a problem on this job. Cold potable water shall be available on site at all times.

#### **Hurricane/Earthquake etc.:**

In the event of hurricane warnings or earthquake, personnel shall secure any loose items outside the building and proceed to a designated evacuation area. Competent person shall account for all employees.

#### **Coordination with Other Trades**

Other trades shall be notified that the regulated area is off limits except for emergency situations coordinated with the onsite Competent Person.

#### **Pre-Modernization / Demolition Inspection**

Prior to modernization / demolition, the contractors' competent person and industrial hygienist shall inspect all entities suspected of containing and/or contaminated with PCBs. A review of all light tubes will be conducted concurrently. The inspection will involve:

1. Ensuring that all electrical current has been cut to electrical fixtures and transformers.
2. Identifying and marking number and location of PCB containing electrical ballasts.
3. Identifying and marking number and location of light tubes to be removed
4. Identifying the location of all work areas and equipment storage areas
5. Identify the location of waste storage prior to transport from the site

#### **Special Hazard Precautions**

When working with PCB containing materials, the following precautions shall always be adhered to:

PCBs shall not be exposed to open flames or other sources of high temperature since toxic decomposition by-products may be produced.

PCBs shall not be heated to temperatures of 55.0C (135.0F) or higher without approval. Smoking, eating and drinking are not permitted within 50 feet of the PCB control area.



### **Removal and Disposal of Electrical Ballasts (Only if needed)**

**If the existing light fixtures will be disturbed or removed**, all fluorescent-ceiling fixtures will be checked from all construction areas prior to the first disturbance. The Contractor is required to inspect every ballast in each fixture and visually verify that each ballast is labeled “No PCBs” or is unlabeled and presumed to contain PCBs. Any ballast found during this process containing PCBs will be properly removed and disposed of as outlined in this specification. Prior to removal of the electrical ballasts, trained personnel shall dismantle the electrical fixtures, with care being taken so as not to cause any spills of PCB containing materials.

**PCB Containing Electrical Ballasts:** PCB containing electrical ballasts shall be carefully removed and packaged separately by placing in DOT approved containers. The use of open top 55-gallon drums with lid and lock band is recommended. A start date must be annotated on a label at the time the first ballast is placed in a drum. When the drums have been filled, the removers will contact the owner point of contact and schedule a time to have a manifest signed and have the drums removed from the site. The containers shall be clearly labeled as containing PCB materials, manifested and transported to disposal at a permitted facility.

Examine each ballast to determine if oil has leaked, as identified by the presence of yellow oil or black tar like material on the outside of the ballasts. Any leaking PCB-containing ballasts or transformers shall be wrapped and sealed in 6-mil plastic disposal bags and placed in a separate steel drum or other approved container. Each disposal drum or container will have a sufficient amount of oil-absorbent material placed in the bottom to absorb any oil from ballasts that are leaking or may leak during transport. Clip off connecting wires as close as possible to the ballasts. Do not bend back ends of ballasts.

All personal protective clothing contaminated with PCB shall be disposed of accordingly.

### **Personnel**

Only personnel trained in working, handling and managing PCB containing materials shall be permitted into the work area. The on-site contractor's competent industrial hygienist shall verify that each employee is trained on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

**Surveillance Personnel:** Surveillance personnel may enter a PCB control area for brief periods of time provided they wear disposable polyethylene gloves and disposable polyethylene foot covers, as a minimum. Additional protective equipment may be required if respiratory hazard is involved or if skin contact with PCB is involved.

### **Personnel Protective Equipment**

Each worker shall be provided with the appropriate personal protective equipment (PPE), as required by OSHA Regulations, PPE shall include, but not be limited to, the following:

- Disposal chemical resistant coveralls
- Chemically resistant gloves over plastic disposable gloves
- Disposable foot covers
- Half-mask cartridge respirator
- Eye protection

### **Execution of Removal**

Ballast having labels with the words "NO PCBs" or labels with similar words having the same meaning, may be disposed of with the light fixture. All other ballast, regardless of age, will be assumed to contain PCB. Ballast containing, or assumed to contain, PCB may be removed from mounted light fixtures, or the entire light fixture may be removed and taken to a ballast removal area. Floor covering requirements must be met if ballast is removed from mounted fixtures, and ballast shall not be dropped, thrown, or miss handled. Open top 55-gallon drums, with lids and lock bands, shall be used for disposal of the ballast.



Floor Covering Requirements: In preparation for ballast removal, the contractor shall spread 6-mil polyethylene sheeting on the floor of the area where the removal is performed. The sheeting shall be sealed at the joints and shall extend 3 feet beyond the work area. Damaged, holed, or torn sheeting shall be resealed before ballast removal work continues or resumes. The purpose of the sheeting is to contain spills.

**Removal of Leaking Ballast (only if needed):** Ballast removal shall be immediately discontinued if any sign of black tar-like or yellow oil like substances are discovered on a ballast, light fixture, or cover. The contractor shall don a Ty-Vek suit, along with the rubber gloves and eye protection before continuing work. Light fixtures, covers, and ballast with the black tar-like substance shall be scraped and wet wiped with an approved solvent until clean and no visible signs of the tar-like substance remain. Use of solvents must be submitted, for approval, to the owner prior to use.

All precautions shall be taken to prevent PCB spills/leakage into the environment. In the case of a PCB spill and/or leakage the contractor shall immediately notify the owner. If the spill is estimated to be in excess of one (1) pound, the local fire department and county environmental compliance department shall also be immediately notified. A PCB spill kit shall always be kept on-site in the immediate vicinity of PCB work areas. Personnel trained in managing and controlling PCB spills/leakage shall undertake the handling of such situations.

In case of PCB spill and/or leak the contractor shall also:

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign, immediately transfer leaking items to a drip pan or other container; initiate cleanup of spill as soon as possible, but no later than 48 hours of its discovery; and properly contained and disposed of as solid PCB waste.

Any and all cleanup shall be documented with records of decontamination in accordance with applicable cleanup rules and regulations.

### **Disposal**

Disposal of oil or tar-like substance cleaning materials: The remover shall place all tar-like substance residue and materials with the tarlike substance on them (such as Ty-Vek suits, disposable scrappers, rags, and floor covering) in a separate steel drum. The external surface of all drums, lids, and lock bands shall be thoroughly cleaned of all tar-like substance, labeled and sealed.

Disposal of The Drums: Arrange for the transport of all properly containerized PCB-containing ballasts to an EPA-approved recycling/disposal facility. The contractor shall complete with all local state and federal agencies as it relates to the disposal of the PCB drummed materials. The drums containing PCB ballast and those containing rags, towels, residue, etc. will be transported and properly disposed of as PCB waste.

The Contractor is responsible for determining and complying with all current applicable regulations pertaining to hazardous waste handling, transport, and disposal of PCB-containing ballasts and transformers. Copies of completed original waste shipment records/manifests documenting the proper transport, recycling, or incineration of non-recycled components shall be provided to the owner upon project completion. The Contractor shall also obtain and provide documentation to the owner that the recycling/disposal facility has all the required permits and approvals necessary for operations involving recycling and disposing of PCB-containing equipment.

### **Disposal of Fluorescent and Other Universal Lamps - Only if needed (light Tubes)**

Background: The U. S. Environmental Protection Agency (EPA) has promulgated regulations governing the accumulation and disposal of Universal Waste Lamps.

The scope of work for the abatement contractor includes the removal and recycling of all fluorescent lamps, mercury vapor bulbs, and high intensity discharge (HID) bulbs from lighting fixtures. Fluorescent lamps, mercury vapor bulbs, and HID bulbs shall be removed prior to starting demolition, properly packaged to prevent breakage, and transported intact to an EPA-approved recycling facility. Contractors responsible for the removal and recycling of the fluorescent lamps, mercury vapor bulbs, and HID bulbs shall handle and manage them in accordance with all local, state, and federal regulations.

All fluorescent-ceiling fixtures will be checked from all construction areas prior to the first disturbance. All the light tubes will be carefully removed from the fixture as not to break the tubes and set aside in a pre-approved secured area prior to disposal. All mercury containing light tubes will be properly removed, stored, and disposed following all local, state, and federal guidelines. Containers for disposal of waste UW lamps (fluorescent lamps) shall be pre-approved by the consultant.

Lamp Removal: Assume all fluorescent lamps associated with this project, regardless of age, are harmful to the environment. The contractor will provide the containers, for disposal of the lamps. After all waste lamps have been placed in the containers, identification and hazard labels shall be placed on each container.

- Carefully remove lamps and bulbs from fixtures. Lamps and bulbs shall remain intact (unbroken) and shall be carefully placed into cardboard containers designed to hold them (preferably original boxes obtained from the manufacturer or special boxes obtained from a lamp recycler).
- Broken lamps and bulbs should still be recycled. However, if they are not acceptable to the recycling facility, they must be evaluated to determine if they are hazardous waste. Remove and discard residues from broken lamps and bulbs promptly. Personnel cleaning up spills should have appropriate training, cleanup equipment, and wear appropriate personal protective equipment. Acceptable storage for broken, damaged, or leaking lamps and bulbs include a closed 55-gallon steel drum or a closed wax fiberboard drum.
- Store boxed lamps and bulbs in a secure area and limit access to personnel qualified to handle them.
- Contact an EPA-approved lamp recycler and arrange for transport of the properly packaged and labeled lamps and bulbs to the recycler.
- Submit copies of the original shipment records documenting proper transport, recycling, and proper disposal of any non-recycled components to the owner upon project completion.

**Mercury-Containing Thermostats and Electrical Switches (if discovered during demolition activities)**

The Contractor shall inspect every thermostat and electrical switch for the presence of liquid mercury. Thermostats and electrical switches that contain mercury shall be carefully removed in accordance with the EPA - Hazardous Waste “Universal Waste” Guidance Documents and regulations, from their mounted position, wrapped to prevent breakage, and placed in a sealable, rigid, labeled container with absorbent material in the bottom. The Contractor shall arrange to have the mercury properly transported to and recycled by an authorized recycling facility. Provide to the owner, copies of shipping papers, manifest, and documentation demonstrating that the mercury has been properly transported and delivered to an approved recycling/disposal facility upon project completion. All mercury containing materials will be properly removed, stored, and disposed following all local, state, and federal guidelines and current regulations.

**Nickel-Cadmium, Lead-Acid, and Other Metal-Containing Batteries, Nuclear Power Source Emergency Lighting**

The Contractor shall check all batteries in emergency lighting fixtures, emergency exit signs, generators and battery charging systems, and other electrical equipment or components for batteries that may contain heavy-metals. This also includes any emergency lighting that has a nuclear power source. All batteries shall be removed in accordance with the EPA - Hazardous Waste “Universal Waste” Guidance Documents and regulations and placed in a separate sealable



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container and delivered to an approved recycling/disposal facility. Provide to the owner documentation demonstrating that all batteries containing hazardous components have been properly removed, transported, and disposed upon project completion following all local, state, and federal guidelines and current regulations.

The Contractor shall remove from the premises all regulated and general waste following all removal, transport, and disposal codes and regulations for each of the waste materials encountered. If needed have them properly containerized, transported, and disposed in accordance with applicable local, state, and federal regulations. Proper personal protective equipment (PPE) will need to be in place during the cleanup and removal of human waste hazards and rotted foods.

Provide to the owner documentation demonstrating that all regulated and general waste has been properly removed, transported, recycled and/or disposed following all local, state, and federal guidelines and current regulations.

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SECTION 03 31 13 STRUCTURAL CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Structural Concrete, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Remove and replace existing concrete as required to complete the work.
  - 2. Concrete Mix Designs.
  - 3. Vapor barrier under interior floor slabs on grade.
  - 4. Concrete reinforcement and accessories.
- C. Related Sections
  - 1. Section 01 45 24 Testing and Inspection Requirements for School Construction
  - 2. Section 03 35 00 Concrete Floor Finishing

1.02 DEFINITIONS AND REFERENCES

- A. Definitions
  - 1. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- B. References
  - 1. ACI 318-2011 Specifications for Structural Concrete for Buildings.
  - 2. ASTM A615 – Deformed and Plain Billet-Steel for Concrete Reinforcement.
  - 3. ASTM C33 – Concrete Aggregates.
  - 4. ASTM C94 – Ready-Mixed Concrete.
  - 5. ASTM C150 – Portland Cement.
  - 6. ASTM C309 – Liquid Membrane – Forming compounds for Curing Concrete.
  - 7. Chapter 19A, California Building Code.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: Provide design mix for each concrete mixture. Design mix shall include data substantiating the reliability of the proposed mix. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Each design mixture shall be stamped and signed by a registered professional engineer licensed in the state of California.
  - 2. Indicate amounts of mixing water to be withheld for later addition at project site.

- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

#### 1.04 QUALITY ASSURANCE

- A. Specified cement and aggregates shall be from single sources only.
- B. Regulatory Requirements: Conform to Chapter 19A, California Building Code.
- C. Tests: Testing and analysis of concrete will be performed under provisions of Section 01 45 24, Testing and Inspection Requirements for School Construction.
- D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- E. Evaluation and acceptance of concrete shall conform to ACI 318-14, Section 1910A.1. Samples for strength testing shall be taken at least once a day or not less than once for each 50 cubic yards of concrete or not less than once for each 2,000 square feet of surface area for slabs or walls.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

### PART 2 - PRODUCTS

#### 2.01 FORM MATERIALS

- A. Conform to ACI 318, Chapter 6.
- B. Plywood Forms: Douglas Fir species; solid one side sound undamaged sheets.
- C. Lumber: Douglas Fir species; construction grade with grade stamp clearly visible.
- D. Form Ties: Removable metal of adjustable length, cone ends.

#### 2.02 REINFORCING STEEL

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade billet steel deformed bars for No. 4 bars or larger, 40 ksi yield grade for No. 3 bars and smaller. Welded bars shall be ASTM A706, 60 ksi yield grade.
- B. Welded Steel Wire Fabric: Plain type, ASTM A185; in flat sheets.

#### 2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type V, Portland Type, conforming to Section 1903A.1, California Building Code.
- B. Aggregates: ASTM C33, conforming to Section 1903A.6, California Building Code.
- C. Fly Ash: ASTM C618, shall conform to Section 1910A.1, California Building Code. Limit percentage of Fly Ash to 15%.

- D. Water: Clean and not detrimental to concrete.

## 2.04 CONCRETE MIX

- A. Mix and deliver concrete in accordance with Section 1903A, California Building Code.

1. Selection of Concrete Proportions: Concrete proportions shall be determined in accordance with the provisions of ACI 318, Section 26.4.3.
2. A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under this provision.
3. Do not exceed 0.45 water-cement ratio, by weight.
4. Concrete shall be mixed by transit mixers only.

- B. Provide concrete to the following criteria:

Element	Min 28 day Strength PSI	Max Slump	Max Size Aggregate	Type
Foundation	4,500	4 inch	1 inch	Reg.
Slabs	4,500	4 inch	3/4 inch	Reg.

- C. Admixtures may be added to the concrete to control the set, effect water reduction and increase in workability at the contractor's option, or at the request of the Engineer, but in either case at the expense of the contractor. Except as otherwise specified, such admixtures shall be a water reducing normal retarding admixture conforming to ASTM C 494 and may be either a hydroxylated carboxylic acid type or a hydroxylated polymer type, but shall contain no calcium chloride. The required quantities of cement shall be used. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's printed instructions.

1. Superplasticizers shall not be used without permission of the Engineer. If used, superplasticizers shall conform to ASTM C, Type F or G; batch plant added using second or third generation only.
2. Admixtures shall be subject to the approval of DSA.

## 2.05 ACCESSORIES

- A. Bonding Agent: Polyvinyl Acetate; HIBOND, manufactured by Lambert Corporation, Orlando, FL, LOCK BOND NO. 906, manufactured by MacklanBurg-Duncan Co., City of Industry, CA, or equal as approved in accordance with Section 01 25 00 for Substitutions.

## 2.06 REINFORCED VAPOR BARRIER

- A. Manufacturer: Reef Industries, Inc. 9209 Alameda Genoa Road, Houston Texas 77075. Phone (800) 231 6074. Web Site [www.reefindustries.com](http://www.reefindustries.com).
- B. Reinforced Vapor Retarder under VCT and carpet: Griffolyn Type 85, 5-ply laminate, combing (3) layers of high density polyethylene and (2) high strength non-woven cord grids.

## 2.07 CURING MATERIALS

- A. Water: Clean from a source suitable for domestic consumption.

- B. Curing Compound: ASTM C309, SHUR-CURE manufactured by Paul M. Wolff Co. water based membrane forming concrete curing compound. White pigmented.

### PART 3 - EXECUTION

#### 3.01 FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of Section 1903A, California Building Code.
- B. Verify lines, levels and measurement before proceeding with formwork.
- C. Hand trip sides and bottom of earth forms; remove loose dirt.
- D. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- F. Align joints and make watertight. Keep form joints to a minimum.
- G. Obtain approval before framing openings in structural members which are not indicated on Drawings.

#### 3.02 REINFORCED VAPOR BARRIER

- A. Install reinforced vapor retarders in accordance with ASTM E 1643 and manufacturer's written instructions.

#### 3.03 PROTECTION

- A. Adequately protect staff, personnel and public from harm and accident during formwork. Conform to California Code of Regulations, Title 8, Subchapter 4, Construction Safety Orders.

#### 3.04 REINFORCEMENT

- A. Place, support and secure reinforcement against displacement.

#### 3.05 PREPARATION FOR CONCRETE WORK

- A. Weather Provisions: Make Provisions for weather conditions in accordance with ACI Specifications ACI 318, the recommendation of the Testing Laboratory, and acceptable to the Architect
  - 1. Hot Weather Requirements: Concrete to be placed during hot weather shall comply with the requirements of ACI 318-14 Section 26.5.5.
- B. Excavations: Before placing of concrete for foundations, insure that the excavations have been inspected and approved by the Soils Engineer. Remove loose dirt from excavations.
- C. Before concrete is placed upon or against concrete that has taken its initial set or has hardened, remove encrustations from the forms and reinforcement, and mechanically roughen hardened concrete to minimum ¼ inch coarseness amplitude.

- D. Prepare previously placed concrete by cleaning with sandblasting to remove laitance and expose clean aggregate.
- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, epoxy set 12 inch long No. 4 steel dowels at 18 inches oc.

### 3.06 PLACING CONCRETE

- A. Place concrete in accordance with Section 1903A, California Building Code.
- B. Notify Architect minimum 24 hours prior to commencement of operations. All excavations, forms and reinforcing shall be inspected and approved by the Architect prior to placement.
- C. Ensure reinforcement, inserts, embedded parts and accessories are not disturbed during concrete placement.
- D. When detailed on the drawings, separate slabs on grade from vertical surfaces with ½ inch thick joint filler.
- E. Extend joint filler from bottom of slab to within ½ inch of finished slab surface using one-component polyurethane sealant as specified in Section 07 92 00.
- F. Place concrete continuously between predetermined expansion, control and construction joints.
- G. Do not interrupt successive placement; do not permit cold joints to occur.
- H. Avoid segregation of materials. Perform tamping and vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.
- I. Provide special mix prepared by the Testing Laboratory and approved by the Architect utilizing smaller aggregates in areas of reinforcing congestion to prevent the formation of rock pockets.
- J. Do not allow concrete to fall free from any height which will cause materials to segregate. Maximum height of free fall permitted in any case: 4 feet. Utilize trunks or additional chutes where doubt occurs.
- K. Construction Joints: Wash surface of each joint shortly after pouring to expose clean, sound aggregate. Sandblast surface to remove laitance remaining or loose aggregate as approved by the Architect. Conform to ACI 318, Chapter 6. Apply bonding agent in accordance with manufacturer's instructions.

### 3.07 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
- B. Provide smooth trowel finish at flat surfaces.

### 3.08 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.
- B. Maintain concrete with minimal moisture loss at above 50 degrees F temperature for period necessary for hydration of cement and hardening of concrete. Dusting with dry cement to absorb excess water is prohibited.



- C. Cure only as specified herein and in accordance with ACI 318, Section 5.11. Membrane curing compound method not permitted for interior cast-in-place concrete slabs.
- D. Moisture Cure: Spray water over floor slab areas and maintain wet for minimum of seven (7) days or spread polyethylene film over floor slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for minimum of seven (7) days. Do not permit traffic over floor slabs during the seven (7) day curing period.
- E. Vertical Surfaces: Spray water over surfaces and maintain wet for 10 days.
- F. Quality Control: Proper curing of concrete surfaces shall be the responsibility of the Contractor under this section.

### 3.09 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Sections 01 45 24 Testing and Inspection Requirements for School Construction.
- B. Provide free access to work and cooperate with Testing Laboratory.

### 3.10 PATCHING

- A. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete. Remove all fins, butts and projections by grinding. Patch voids, rock pockets, holes, cracks and similar imperfections by chipping loose concrete and exposing clean, sound aggregate.

### 3.11 DEFECTIVE CONCRETE

- A. Remove concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect.
- C. Do not patch, fill, touch-up, repair or replace exposed concrete except upon express approval of Architect for each individual area.

END OF SECTION 03 31 13

SECTION 03 35 00 – CONCRETE FLOOR FINISHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Concrete Floor Finishing, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Finishing slabs on grade.
  - 2. Surface treatment with concrete hardener and sealer.

1.02 REFERENCES

- A. ACI 301 and 302 – Structural Concrete for Buildings and Surface Tolerances.
- B. Local AQMD Air Quality Management District.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Submit Product Data: Provide data on finishing agents, product characteristics, compatibility and limitations.
- C. Submit Manufacturer's Installation Instructions: Indicate criteria for preparation and application.
- D. Certify that product meets AQMD, Local Regulations.

1.04 DELIVERY AND STORAGE

- A. Deliver and store materials in manufacturer's packaging including application instructions.

PART 2 - PRODUCTS

2.01 FINISHES

- A. Combination Hardener and Sealer: SHUR-SEAL, by Paul M. Wolff Co., Orange, CA.
- B. Or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify site conditions.
- B. Verify that floor surfaces are acceptable to receive the work of this Section.

### 3.02 FINISHING FLOORS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While concrete is still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of ¼ inch in one direction.
  - 1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with pwer-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture
  - 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid applied or sheet waterproofing, built up or membrane roofing, or sand bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in testure and appearance. Grind smooth any surface defects.
  - 1. Apply trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, this set tile, ceramic or quarry tile set over a cleavage membrane, paint or other thin-film-finish coating.
  - 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
  - 3. Grind high spots of all slabs as required to meet minimum flatness and levelness values
  - 4. Concrete exposed to view shall be slip resistant per CBC 11B-302.1
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains.

### 3.03 FLOOR SURFACE TREATMENT

- A. Apply combination hardener and sealer and penetrating sealer to concrete slab surfaces as scheduled or shown on drawings in accordance with manufacturer's instructions.
  - 1. Sweep areas to be treated with fine bristle broom. Hose floor to remove dust and dirt.
  - 2. Apply material to dry surfaces or damp. Dispose of standing puddles.
  - 3. Uniformly distribute material at the rate of 200 to 300 sf per gallon.

END OF SECTION 03 35 00

SECTION 04 05 13 MORTAR AND GROUT

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Mortar and Grout, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Mortar and grout for masonry.
- C. Related Sections:
  - 1. Section 01 45 24 Testing and Inspection Requirements for School Construction.
  - 2. Section 04 22 00 Reinforced Concrete Masonry Units.

1.02 REFERENCES

- A. ASTM C150 – Portland Cement.
- B. ASTM C207 – Hydrated Lime for Masonry Purposes.
- C. ASTM C476 – Grout for Reinforced and Non-Reinforced Masonry.
- D. ASTM C1586 Field Test Specimens for Mortar.
- E. ASTM C150 – Portland Cement and Blended Hydraulic Cements.
- F. ASTM C494 – Chemical Admixtures for Concrete.
- G. Chapter 21A, California Building Code.
- H. ACI 530-11 – Requirements and Specification for Masonry Structures

1.03 SUBMITTALS

- A. Design Mixtures: Provide design mix for each type of grout.
- B. Submit manufacturer's certificate that products meet or exceed specified requirements.
- C. Colored mortar samples showing the full range of colors available

1.04 QUALITY ASSURANCE

- A. Testing and Inspection: Test mortar and grout in accordance with Section 01 45 24, Testing and Inspection Requirements for School Construction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

#### 1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperatures to minimum 40 degrees F prior to, during and 48 hours after completion of masonry work.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Portland Cement: ASTM C150, Type V, Low Alkali.
- B. Mortar Aggregate: Section 2103A.2, California Building Code.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Grout Aggregate: Section 2103A.3.1, California Building Code.
- E. Water: Clean and potable.
- F. Bonding Agent:
  - 1. WELD-CRETE; Larsen Products Corp., Rockville, MD.
  - 2. SONOCRETE; Sonneborn Building Products, Hayward, CA.
  - 3. THOROBOND; Thoro System Products, Newark, CA.
  - 4. Or equal.

#### 2.02 MORTAR COLOR

- A. When colored masonry units are required colored grout shall be required. Color as selected by the Architect.
  - 1. Davis Colors, Los Angeles, CA, or equal.

#### 2.03 MORTAR

- A. Mortar shall be Type S per ASTM C 270 and TMS 602/ ACI530.1/ ASCE 6 Articles 2.1 and 2.6A.
- B. Mortar Compressive Strength at 28 days: 2000 psi.
- C. Mortar proportions shall be per ASTM C 270 and TMS 602/ ACI530.1/ ASCE 6 Articles 2.1 and 2.6A.

#### 2.04 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use. No admixtures permitted. Add lime last, in accordance with ASTM C 270 and TMS 602/ ACI530.1/ ASCE 6 Articles 2.1 and 2.6A.
- B. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration. Omit mortar color where surfaces are scheduled to receive plaster or paint.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, retemper by fully mixing with required volume of water, only within one hour of mixing. Dashing or pouring water over mixture not permitted.
- E. Use mortar within two hours after mixing at temperatures of 80 degrees F.

2.05 GROUT MIX

- A. Grout shall conform to CBC Section 2103A.3 and ACI 530.1 Article 2.2. A mixture of cement, sand, pea gravel and water which will completely fill all voids in the wall. Conform to ASTM C476.
- B. Grout Compressive Strength at 28 days: Must equal or exceed the specified compressive strength of masonry, but shall not exceed 5,000 psi.

2.06 GROUT MIXING

- A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476.
- B. Do not use anti-freeze compounds to lower the freezing point of grout.

2.07 CALIBRATING

- A. Proportion mortar and grout mixes by accurate volume measurements. Maintain at the site, calibrated boxes or containers of such nature that quantities measured can be readily and accurately checked at any time. Proportion by shovel measure not permitted, in accordance with Section 2103A, California Building Code.

PART 3 - EXECUTION

3.01 TESTING AND INSPECTION

- A. Request inspection of spaces to be grouted. Masonry work shall be continuously inspected during laying and grouting by the Project Inspector in accordance with Section 1704A.6, California Building Code.
- B. Testing shall be in accordance with CBC 2105A.

3.02 INSTALLATION

- A. Install mortar and grout in accordance with Section 2104A, California Building Code.

- B. When grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the pour for grout 1 ½" below the top of the uppermost masonry unit.
- C. All vertical cells shall be grouted solid in lifts not exceeding 4'-0" in height.
- D. Work grout into masonry cores and cavities to eliminate voids. Use coarse grout in cavities 2 inches wide or more and in all filled cell construction.
- E. Do not displace reinforcement while placing grout.
- F. Remove grout spaces of excess mortar.

3.03 PREPARATION

- A. Apply bonding agent to existing surfaces.
- B. Plug cleanout holes to prevent leakage of grout materials. Brace masonry for wet grout pressure.

3.04 CURING

- A. When atmosphere is extremely dry, dampen the masonry surfaces with a light fog spray for three days during the curing period for the mortar. Use a nozzle regulated fog spray sufficiently to dampen but not of such quantities to cause water to flow down over masonry.

END OF SECTION 04 05 13

SECTION 04 22 00 CONCRETE UNIT MASONRY

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Reinforced Concrete Masonry Units, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Concrete masonry units.
  - 2. Reinforcement, anchorage and accessories.
- C. Related Sections
  - 1. Section 01 45 24 Testing and Inspection Requirements School Construction
  - 2. Section 04 05 13 Mortar and Grout

1.02 REFERENCES

- A. ASTM A615 – Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- B. ASTM D1751 – Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- C. ASTM C90 – Hollow Load Bearing Concrete Masonry Units.
- D. Chapter 21A, California Building Code.

1.03 SUBMITTALS

- A. Product data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
  - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, Details and Detailing of Concrete Reinforcement.
- C. Samples for Initial Selection and Verification for the following:
  - 1. Unit masonry samples in small scale form showing the full range of colors and textures available for each different exposed masonry unit required.

1.04 QUALITY ASSURANCE

- A. Tests and Inspections: Section 01 45 24, Testing and Inspection Requirements for School Construction.
- B. Make test prisms in accordance with ASTM C1314.
- C. Installer Qualifications



1. Company specializing in performing the work of this Section with minimum five years experience.

D. Mock-Up

1. Provide mock-up of concrete masonry in a location as approved.
2. Erect masonry to 3 x 4 feet panel size. Include specified mortar and accessories and one expansion joint.
3. When accepted, mock-up will demonstrate minimum standard for the work. Mock-up may remain as part of the work.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site, store and protect materials from damage.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. No masonry operations permitted when surrounding air temperature is 40° F or lower.

1.07 PRE-INSTALLATION CONFERENCE

- A. Convene two weeks prior to commencing work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of the following manufacturer or supplier form the basis for design and quality intended.
  1. RCP Block and Brick, Lemon Grove, CA.
- B. Equal products of the following may be submitted for approval.
  1. Orco Block Co., Inc., Stanton, CA.
  2. Or equal

2.02 CONCRETE MASONRY UNITS

- A. Masonry Units: , ASTM C90, Type II, Grade N-1, medium weight.
- B. Compressive Strength of Masonry Unit: 2800 psi in accordance with ASTM C90.
- C. Compressive Strength of Assembled Masonry:  $F'm = 2,000$  psi
- D. Size: as per drawings.
- E. Type: as per drawings.
- F. Color: See Exterior Elevations for locations of colored masonry. Color as selected by Architect.
- G. Provide units manufactured in one batch production to assure continuity of color.
- H. Provide bull nose radius corners for all units with outside corners.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade.
- B. Welded Reinforcing Steel: ASTM A760, 60 ksi yield grade. Comply with AWS D1.4.

2.04 ACCESSORIES

- A. Steel Wire Ties: Minimum 16 gage black annealed type.
- B. Expansion Joint Filler: ASTM D1751; close cell bituminous saturated fiberboard, ½ inch thick, FIBER EXPANSION JOINT manufactured by The Burke Co., San Mateo, CA. or equal.
- C. Sealant: Two-component Polyurethane, Non-sag.
- D. Backer Rod: Closed cell polyethylene; oversized 50 percent to joint width; self-expanding; DENVER FOAM or GREEN ROD, manufactured by the Pecora Corp., Harleysville, PA, or equal.
- E. Cleaning Solution: Not harmful to masonry work or adjacent materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Provide temporary bracing during installation of masonry work. Maintain in place.
- B. Sandblast concrete foundation clean prior to installation of first masonry course.

3.03 COURSING

- A. Establish lines, levels and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

3.04 PLACING AND BONDING

- A. Lay hollow masonry units in full bed of mortar with full head joints, uniformly jointed with other work.

- B. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- C. Remove excess mortar as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Maximum Variation from Unit to Adjacent Unit: 1/32 inch.
- H. Maximum Variation from Plane of Wall: ¼ inch in 10 feet and ½ inch in 20 feet or more.
- I. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and ¼ inch in 10 feet ½ inch in 30 feet.
- J. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

### 3.05 REINFORCEMENT

- A. Support and secure reinforcing bars from displacement. Maintain position within ½ inch of dimensioned position.

### 3.06 GROUTED COMPONENTS

- A. Lap splices in reinforcing steel as per drawings.
- B. Support and secure reinforcing bars from displacement. Maintain position within ½ inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.

### 3.07 MASONRY CONSTRUCTION

- A. Masonry units shall be placed in common bond unless noted otherwise.
- B. Reinforced hollow unit masonry shall be built to preserve the unobstructed vertical continuity of the cells. Head joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells. Conform to Section 2104A, California Building Code.
- C. Walls and cross webs forming such cells shall be full-bedded in mortar to prevent leakage of grout.
- D. Mortar shall be as specified in Section 04 05 13, Mortar and Grout.
- E. Bond shall be provided by lapping units in successive vertical courses.
- F. Vertical cells shall have vertical alignment sufficient to maintain a clear, unobstructed continuous vertical cell measuring not less than 2 inches x 3 inches.
- G. At the time of laying, masonry units shall be free of excessive dust and dirt.
- H. Grout shall be as specified in Section 04 05 13, Mortar and Grout.

- I. Grout shall be workable mix suitable for placing without segregation and shall be thoroughly mixed. Grout shall be placed by pumping or an approved alternate method and shall be placed before initial set or hardening occurs. Grout shall be consolidated by puddling or mechanical vibration during placing, and reconsolidated after excess moisture has been absorbed but before workability is lost.
- J. Reinforcing except tie wires shall be embedded in the grout. The spacing between masonry units and reinforcing shall be a minimum of one bar diameter.
- K. Horizontal reinforcement shall be placed in bond beam units. The openings through webs for horizontal reinforcement shall be a minimum of 3 inch x 3 inch.
- L. Reinforcing shall be in place prior to grouting. Vertical reinforcing bars shall be held in position at the top, bottom and at intervals not farther apart than 160 bar diameters.

### 3.08 GROUT CONSTRUCTION

- A. The vertical cells shall be grouted solid. Grouting shall be done in continuous pour in lifts not exceeding 4'-0" in height for high lift grouting. Lifts shall not exceed one masonry unit in height for low lift grouting. Follow requirements of 2104A.1.3.1.1.1.2 and DSA IR 21-2.13 for high lift grouting. All overhanging mortar and mortar droppings shall be removed prior to grouting.
- B. High Lift grout may be used with full compliance to CBC Section 2104A.1.3.1.1. and DSA IR 21-2.13. Lifts shall not exceed 8'-0" in height for high lift grout.
- A. Conform to Section 2104A, California Building Code.
- B. Grouting shall be consolidated so as to completely fill all voids and embed all reinforcing steel.
- C. When grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the pour of grout not less than 1 ½ inch below the top of the uppermost unit grouted.
- D. Horizontal steel shall be fully embedded in grout in an uninterrupted pour.

### 3.09 EXPANSION JOINTS

- A. Install expansion joints at approximately 20 ft oc, maximum 25 ft oc, unless indicated otherwise.
- B. Install preformed control joint devices in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Form expansion joint to full depth of wall, sealant both sides.

### 3.10 BUILT-IN WORK

- A. As work progresses, build in metal frames, anchor bolts and other items furnished by other Sections.
- B. Build in items plumb and level.
- C. Bed anchors of metal frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build in organic materials subject to deterioration.

### 3.11 CUTTING AND FITTING

- A. Cut and fit for conduit, sleeves, piping, grounds and other inserts. Coordinate with other Sections of work to provide correct size, shape and location. Cut blocks neatly and true.
- B. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.
- C. Core holes required for masonry testing shall be patched neatly to restore walls as nearly as possible to their original appearance.

### 3.12 CURING

- A. When atmosphere is dry, dampen the masonry surfaces with a light fog spray for three days during the curing period for the mortar. Use a nozzle regulated fog spray sufficiently to dampen but not of such quantities to cause water to flow down over masonry.

### 3.13 CLEANING

- A. Remove excess mortar and mortar smears.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with an approved cleaning solution.
- D. Use non-metallic tools in cleaning operations.

### 3.14 PROTECTION OF FINISHED WORK

- A. Protect finished installation from damage.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

### 3.15 TESTING

- A. Compliance with the requirements for the specified compressive strength of masonry shall be in accordance with Section 2105A. California Building Code.
- B. Masonry core test shall be provided as required per Section 2105A.4 California Building Code.

END OF SECTION 04 22 00

SECTION 05 12 00 – STRUCTURAL STEEL

PART I – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with structural steel, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Structural steel framing.
  - 2. Steel pipe and tube framing.
  - 3. Shop priming and field touch-up to extent specified.
  - 4. Hoisting of metal floor and roof decking.
- C. Related Sections:
  - 1. Metal Fabrications: Section 05 55 00.
- D. Product furnished but not installed under this section:
  - 1. Anchor bolts and loose bearing and setting plates: Installed under Division 3.

1.02 REFERENCES

- A. Comply with provisions of California Code of Regulations (CCR) Title 24, Part 2, Chapter 22A.
- B. ASTM A-572 Grade 50, Standard Specification for Structural Steel Shapes.
- C. ASTM A36, Standard Specification for Structural Steel Plates.
- D. ASTM A-53, Grade B, Standard Specification for Structural Steel Pipes.
- E. ASTM A500 Grade B Standard Specification for Steel Tubing.
- F. ASTM A-325N, Standard Specification for Typical Steel Connection Bolts.
- G. AWS D1.1, Structural Welding Code -Steel.

1.03 SUBMITTALS

- A. Product Data: Submit copies of producer's or manufacturer's data and installation instructions for the following products. Include laboratory test reports and other data required to show compliance with these specifications:
  - 1. Structural steel, including certified copies of mill test reports covering chemical and physical properties.
  - 2. Unfinished bolts and nuts.
  - 3. High strength bolts, including nuts and washers.
- B. Shop Drawings:

1. Submit shop drawings covering all structural steel including welding, accessories, and fastenings. Fully detail minor connections and fastenings not shown or specified to meet required conditions. Include detailed sequence plan for shop and field welding that minimizes locked-in stresses and distortion.
2. Make erection diagrams as complete as possible before first submittal. Calculate dimensions using all drawings. Report dimensions not derivable from drawings to Architect for clarification.
3. All welds, both shop and field, shall be indicated by A WS Welding Symbols. Indicate net weld lengths.

C. Proof of Compliance for Materials: Submit mill test reports.

#### 1.04 QUALITY ASSURANCE

- A. Qualify Welding processes and welding operators in accordance with A WS Structural Welding Code.
- B. Provide certification that welders employed in work have satisfactorily passed A WS qualification tests within 12 previous months.

#### 1.05 DELIVERY, STORAGE, & HANDLING

- A. Delivery of materials to be installed under other sections:
  1. Deliver anchor bolts and other anchorage devices to be embedded in concrete or masonry construction to the project site in time to be installed.
  2. Provide setting drawings, templates, and directions for the installation of the anchor bolts and other devices.
- B. Storage of Materials:
  1. Store steel above ground on platforms, skids, or other acceptable supports. Protect steel from corrosion.
  2. Welding Electrodes: Deliver to the site in unbroken packages bearing the manufacturer's name and label identifying the contents.
  3. Store other materials in a watertight and dry place until ready for incorporation into the work.

#### 1.06 PROJECT CONDITIONS

- A. Site Measurements: Take field measurements as required. Report discrepancies between drawings and field dimensions.
- B. Protection of Floors: Use Caution to protect floor slab and adjacent work from damage. Do not overload floors. Use rubber tired equipment to handle and move steel. Do not place steel members directly on floor; use pads of timber or like material for cushioning.
- C. Temporary Flooring: Provide necessary temporary planking, scaffolding, and flooring for erection of structural steel or support of erection machinery. Conform use of temporary floors or steel decking to code.
- D. Connection of Steel Decking Temporary Flooring: Temporarily weld steel decking to supports where used as a working platform. Distribute concentrated loadings from welding machines and other heavy machinery with planking or equal. Replace decking damaged by use as a working platform.

### PART 2 – PRODUCTS

#### 2.01 MATERIALS

- A. General: New tested stock complying with reference specifications herein specified.
- B. Structural Steel: ASTM A-36, ASTM A-572, Grade 50.
- C. Steel Tubes: ASTM A500, Grade B.
- D. Steel pipe: ASTM A53, Grade B.
- E. Fastening Materials:
  - 1. Machine Bolts: ASTM A307, Grade A.
  - 2. High Strength Bolts, together with their nuts and washers: ASTM A325, Type I or 2 fastener requirements. Provide with identification markings and manufacturer's identification symbol on each item. High strength bolts may be "Tension Set Type" and shall be one of the following:
    - a. TS Bolt F9T by Cold Forming Specialties, Inc.
    - b. Load Indicator Bolt by Bethlehem Steel Corp.
    - c. LeJeune Tension Control Bolt by Consolidated Nut & Bolt Co.
  - 3. Electrodes: A WS D5 .1, E70XX Series as required for intended use. A WS Designation E70T-4 shall not be used.
- F. Anchor Bolts: ASTM F1554, Grade 36, Headed Type unless otherwise indicated.
- G. Shop Primer: Tacmac 99QD or a009, Tust-Oleum 678 or 7086 metal primer or other; all in compliance with SCAQMD regulations.
- H. Non-shrink Grout: As specified in Section 03 31 13.
- I. Miscellaneous Materials: As necessary to complete this work.

## 2.02 MATERIAL TESTING

- A. Tests of Structural Steel: Comply with CBC Section 2213A.
  - 1. Identified Structural Steel: Tests are waived for steel identified by heat number, accompanied by mill analysis and mill reports, and properly tagged with Identification Certificate so as to be readily identified for conformance with ASTM A6 and CBC Section 2203A.
  - 2. Unidentified Steel: If structural steel cannot be identified or its source is questionable, it shall be tested to meet the minimum chemical and mechanical requirements of the ASTM standard appropriate for the specified steel. Additional tests may be required when deemed necessary by the Architect, Structural Engineer, or DSA.

## 2.03 FABRICATION

- A. Workmanship: According to the approved submittals, reference standards as applicable, and requirements herein. Fabricate and form the work to meet actual installation conditions verified at the site.
- B. Before being fabricated or worked, material shall be thoroughly wire brushed, cleaned of loose mill scale and rust, and straightened by methods that will not injure steel.
  - 1. After punching or working the component parts of a member, remove twists, bends, and open joints.



- C. Fabricate all structural steel in accordance with AISC specification.
- D. Punch or drill holes. Do not burn holes.
- E. Shop Paint:
  - 1. Minimum cleaning requirements: In accordance with SSPC-SP-3.
  - 2. After surfaces are properly cleaned, provide one coat of shop paint to attain a minimum dry film thickness of two mils.
  - 3. Block out at connections and omit shop paint.
  - 4. Omit shop paint at concrete-encased steel and steel that receives spray applied fireproofing.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

- A. Verify governing dimensions and conditions at project site before commencing any work.
- B. Verify the location and elevation of all anchor bolts and concrete surfaces supporting column bases. Tolerances for anchor bolts and concrete surfaces:
  - 1. Elevation of concrete surfaces: +3/8 inch.
  - 2. Elevation top of anchor bolts: + 1 inch, minus 3/8 inch.
  - 3. Out-of-position of anchor bolts: + 1/8 inch.

#### 3.02 ERECTION

- A. Erect all structural steel in accordance with AISC specification.
- B. Erection Tolerances: In accordance with the AISC Code of Standard Practice for Steel Buildings. Tolerances shall be compensating, not cumulative.
- C. Field Assembly:
  - 1. Members and sections of sizes, weights, shapes, and true arrangements shown, closely fitted, and finished true to line and in precise position necessary to allow accurate erection and proper joining of parts in the field. Drifting to enlarge unfair holes will not be allowed.
  - 2. Do not heat rolled sections, except for minor details.
- D. Contact:
  - 1. Component parts of built-up members shall be well pinned and rigidly maintained in close contact using clamps or temporary bolting during welding.
  - 2. Compression joints depending upon contact bearing shall have bearing surfaces accurately milled perpendicular to their axis.
- E. Punching, Drilling, and Reaming:
  - 1. Material may be punched 1/16 inch larger than the nominal diameter of the bolt, wherever the thickness of the metal is equal to or less than the diameter of the bolt plus 1/8 inch.
  - 2. Where the metal is thicker than the diameter of the bolt plus 1/8 inch, the holes shall be drilled or sub-punched and reamed.
  - 3. The diameter for sub-punched holes, and the drill for sub-drilled holes, shall be 1/16 inch smaller than the nominal diameter of the bolt to be drilled.

4. Finished holes shall be precisely located to insure passage of bolts through assembled materials without drifting. Enlargement of holes necessary to receive bolts shall be done by reaming. Poor matching of holes shall be sufficient cause for rejection.

F. Bolting:

1. Where structural joints are made using high strength bolts, hardened washers and nuts tightened to a high tension, the materials, method of installation and tension control, types of wrenches to be used, and inspection methods shall conform to Specifications for Structural Joints using ASTM A325 bolts, established by the Research Council on Riveted and Bolted Structural Joints, of the Engineering Foundation.
  - a. High strength bolts used shall have a suitable identifying mark placed on top of the head before leaving the factory.
  - b. Hardened washers shall be installed in accordance with AISC Specifications.
  - c. Contact bearing surface of bolted parts and bolt threads shall be free of scale, slag, burrs, and pits, or dirt, paint, or other foreign material and/or any defects which would prevent solid seating of parts.
  - d. Bolt lengths shall be grip plus 1-1/2 inches.
  - e. If bolting is done using Coronet load indicators, inspections may be done on a periodic basis, but each connector in every connection will be visually examined, and a minimum of 10% of connectors in each joint checked with a Coronet gap gage.
  - f. Testing laboratory will certify to Owner in writing at completion of work, that high strength bolting has been done in accordance with contract requirements and applicable standards.
2. Common Bolts: Unfinished bolts may be used for all connections that are so indicated on the drawings, using bolts of the sizes called for with the nuts drawn tight. The edge distances shall be at least those indicated in the reference standard referred to above.

G. Structural steel shall be carefully planned and laid out so that a minimum of cutting will be necessary:

1. Erect the work plumb, square and true to line and level, and in precise positions as shown.
2. Provide temporary bracing and guys wherever necessary to provide for loads and stresses to which the structure may be subjected, including those due to erection equipment and its operation. Leave in place as long as necessary for safeguarding all parts of the work.

H. Temporary Connections: As erection progresses, the work shall be securely bolted up as necessary to maintain the steel in proper position while field bolting and welding is being done, and as necessary to take care of dead loads, winds and erection stresses.

I. Set column base plates in exact position, both as to alignment, level, and elevation, and support on steel wedges, or equivalent, until the grout thereunder has thoroughly set.

1. The center of each base shall be true to the column center within 1/16 inch and adjust its elevation to plus or minus 0.0025 ft. (1/32 inch). Plates shall be exactly level on both axes.

J. Gas Cutting:

1. Use of a cutting torch is allowed where the metal being cut is not carrying stress during the operation, and provided stresses will not be transmitted through a flame-cut surface.
2. Make gas cuts smooth and regular in contour. To determine the effective width of members so cut, deduct 1/8 inch from width of the gas cut edges. Make the radius of re-entrant gas cut fillets as large as practicable, but in no case less than 1 inch.

3.03 WELDING

- A. Welding and Welded Joints: Detail and execute in accordance with the requirements of the A WS standards, the Structural Welding Code, A WS DI.1 , and CBC Chapter 22A, and as modified by the drawings. In the event of conflict, the drawings take precedence. Perform structural welding by one of the following processes:

- 1. All welding to be Shielded Metal Arc Welding Process.

- B. In addition, welding and welded joints shall comply with CBC Chapter 22A.

#### 3.04 ANCHOR BOLTS

- A. Furnish to the project site when and as required to maintain project progress, all anchor bolts to be embedded in concrete and masonry for securing of structural steel in proper position.
- B. Provide the necessary drawings and templates for setting of such anchor bolts.
- C. Setting of anchor bolts in hardened concrete, necessitated through error or oversight, and in existing concrete shall be as acceptable to the Architect in suitable drilled holes solidly grouted in place, or embedded in an acceptable structural epoxy.

#### 3.05 DRYPACKING OF BASES AND PLATES

- A. Maintain bases and bearing plates in proper location and in proper level while they are being grouted.

#### 3.06 TESTING AND INSPECTION

- A. Testing laboratory will inspect all shop and field welding and high strength bolting.
  - 1. Inspection of welding operations shall be made by a qualified Welding Inspector approved by DSA.
  - 2. Inspection of high strength bolt installation shall be made by a Special Inspector approved by DSA.
  - 3. Testing of high strength bolts, nuts, and washers shall be made in compliance with CBC Chapter 22A, 2213A.
  - 4. Base metal thicker than 1-1/2 inch, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically tested in accordance with CBC Chapter 22A.
- B. Inspection: According to the reference standards. The inspector shall visually inspect welds, shall be present to inspect and approve all groove, multi-pass, and penetration welding performed in the fabricator's shop or at the site, and shall inspect all erection including the drypacking under base plates.
- C. Tests of Welding and Bolting: The testing laboratory shall inspect all shop and field welding to conform to requirements of code and certify, in writing after completion of the work, that all welding has been performed in accordance with the drawings, specifications, and code.

END OF SECTION 05 12 00

SECTION 05 51 33 VERTICAL METAL LADDERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Ladders, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide exterior roof access ladder.
  - 2. Provide interior roof access ladder.

1.02 SUBMITTALS

- A. For each type of roof accessory required, submit the following as per Section 01 33 00, Submittal Procedures:
  - 1. Product Data.
  - 2. Shop Drawings.
  - 3. Coordination Drawings showing other items on roof.
  - 4. Finish Samples.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Manufacturers: Products of the following manufacturer or supplier form the basis for design and quality intended.
  - 1. ALACO Ladder Company, 5167 "G" Street, Chino CA 91710  
Phone: 888 310 7040 Fax: 909 591 7565
- B. Exterior Ladder:
  - 1. Exterior Model: ALACO No. 563-C Parapet Return
  - 2. Exterior Anchorage: All wall mounted as per details on drawings.
- C. Exterior Ladder Materials:
  - 1. Aluminum: 6061-T6
  - 2. Rungs: 1 1/8" round serrated, 3600 lb. shear strength.
  - 3. Channels: 2 7/8" side rails
- D. Interior Ladder:
  - 1. Interior Model: ALACO Model 560
  - 2. Interior Ladder Anchorage: Anchored to floor and wall.
- E. Interior Ladder Materials:

1. Aluminum: 6061-T6
2. Rungs: 1 1/8" round serrated, 3600 lb. shear strength.
3. Channels: 2 7/8" side rails

F. Interior Ladder Size:

1. Width: 20-1/4"

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Anchor ladder as per drawings or manufacturers instructions.

3.02 CLEANING AND PROTECTION

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 05 51 33

SECTION 05 55 00 METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Section includes metal fabrications, including:
  - 1. Steel angles for sills, curbs, ledges, closures and lintel.
  - 2. Elevator threshold angles and pit screens.
  - 3. Concrete-filled pipe guards.
  - 4. Steel bar gates and fencing.
  - 5. Mechanical chase in slab on grade
  - 6. Steel plate and steel blocking welded to steel studs for attachment of handrails, brackets, grab bars, fixtures, benches, and other items as required.
  - 7. Miscellaneous plates, angles and attachment for anchorage of work of this and other sections.
- C. Related Sections:
  - 1. Structural Steel: Section 05 12 00.
  - 2. Finish field painting of material fabrications: Section 09 91 00.
  - 3. Sheet Metal Flashing and Trim: Section 07 62 00.
  - 4. Non-Structural Metal Framing: Section 09 22 16.
- D. Definition: Miscellaneous metal 10 gauge and heavier are included under this section except as otherwise specified in other sections.

1.02 SUBMITTALS

- A. Shop Drawings: submit shop drawings fully detailing work of the section, including accessories, fastenings, and welding. Include minor connections and fastenings not indicated or specified to meet required conditions; indicate in detail on shop drawings.
- B. Product Data – Manufacturer’s Literature: Brochure describing items, specifications and installation instructions for manufactured items.

1.03 QUALITY ASSURANCE

- A. Reference Standards – comply with the following:
  - 1. AIS, Design, Fabrications and Erection of Structural Steel for Buildings.
  - 2. AISI, Specifications for the Design of Cold-formed Steel Structural Members.
  - 3. AWS D.1.1, Structural Welding Code – Steel.
  - 4. ASTM A6, General Requirements for the Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use. Comply with CFC, Chapter 35, Welding and Hot Work.
  - 5. CBC Chapter 22A.

1.04 PRODUCT DELIVERY AND HANDLING:

- A. Protect items from damage during shipping, handling and storage. Work showing dents, creases, deformations, weathering or other defects is not acceptable. Deliver welding electrodes to site in unopened packages bearing manufacturer’s name and product identification.

1.05 JOB CONDITIONS:

- A. Verify field measurements prior to fabrication of items. Use caution to protect concrete floor surfaces and adjacent work from damage.

PART 2 – PRODUCTS

2.01 BASIC MATERIALS

- A. Structural Steel Plates, Shapes, Bars and Sheets:
  - 1. Structural Sizes, Shapes and Plates: ASTM A36, except for plates to be bent or cold-formed.
  - 2. Plates to be Bent or Cold-Formed: ASTM A283, Grade C.
  - 3. Bars and Bar-Size Shapes: ASTM A663, of ASTM A36.
  - 4. Sheets: ASTM A653, coating class G90.
  - 5. Hot-Rolled Carbon Steel Bars and Bar-Size Shapes: ASTM A575, Grade as selected by the fabricator.
- B. Steel Pipe: ASTM A53, Type E of S, Grade B – use Grade A for pipe required to be bent.
- C. Steel Tubing: ASTM A500, Grade B.
- D. Malleable Iron Castings: ASTM A47.
- E. Anchors – Inserts:
  - 1. Threaded Type: ASTM A47 or ASTM A27; hot-dip galvanized in accordance with ASTM A153.
  - 2. Slotted Type: ASTM A283; hot-dip galvanized in accordance with ASTM A123.
- F. Fasteners: Zinc-coated, galvanized for exterior use or when used in exterior walls, in accordance with ASTM A153. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.
  - 1. Standard Bolts and Nuts: Regular hexagon type, ASTM A307, Grade A.
  - 2. Lab Bolts: Square head type, FS FF-B561.
  - 3. Machine Screws: Cadmium-plated steel, FS FF-S-92.
  - 4. Wood Screws: Flat head carbon steel, FS FF-S-111.
  - 5. Plain Washers: Round, general assembly grade carbon steel, FS FF-W-92.
  - 6. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
  - 7. Other Fastener Type: As required for the condition of use.
- G. Welding Electrodes: Appropriate type for the metal to be welded. Comply with AWS D1.1.
- H. Prime Paint: 1009 Metal Primer by Tnemec Co., Inc., 7086 Metal Primer by Rust-Oleum Corp. or equivalent meeting SCAQMD requirements.
- I. Galvanizing: ASTM A123, hot-dip, 2 oz. per sq. ft. coating on actual surface with minimum 1.08 oz. coating on any specimen. Bonderize as required for finish painting. Galvanize exterior steel and as shown on drawings.

- J. Galvanizing repair material: All States Galvanizing Powder, Drygalv by American Solder and Flux, or equal hot applied repair material, or anodic zinc-rich galvanizing repair paint conforming to Mil Spec DOD-P-21035.
- K. Setting compound: Hallemite Inc. "Por-Rok" for interior dry conditions, "Super Por-Rok" for exterior and wet conditions.
- L. Miscellaneous Materials: Ad hereinafter specified and as necessary to complete this work.

## 2.02 GENERAL FABRICATION REQUIREMENTS

- A. Conform to approved submittals, Section 1.03 "Quality Assurance" above as applicable to the work, and requirements herein. Fabricate and form the work to meet actual installation conditions as verified at the site. Obtain necessary templates and information and provide holes and drilling indicated or required for securing work of other sections to metal fabrications.
- B. Fabricate items to design shown. Furnish members in longest lengths commercially available within the limits shown and specified. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items. Provide opening, cut-outs, and tapped holes for attachment and clearances required for other work. Prepare members for the installation and fitting of hardware. Provide reinforcement to support cut edges where required. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
- C. Welding: Conform to AWS D1.1, as modified by referenced AISC Standards, and as indicated or noted on drawings. Unless otherwise indicated or specified, weld joints by shielded electric-arc method. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignments. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces. Grind exposed welds subject to contact to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finishing treatment is required for concealed welds and other exposed welds except as specified. Cut out defective welding and replace.
- D. Joining: Miter or butt members at corners. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
- E. Anchors: Where metal fabrications are shown to be preset in concrete, weld 1-1/4 by 1/8 inch steel trap anchors, 6 inches long with one inch hooked end, to back of member at 2 feet on center, unless otherwise shown. Where metal fabrications are shown to be built into masonry use 1-1/4 by 1/8 inch steel strap anchors, 10 inches long with 2 inch hooked end, welded to back of member at 2 feet on center, unless otherwise shown.
- F. Cutting and Fitting: Accurately cut, machine and fit joints, corners, copes, and miters. Fit removable members to be easily removed. Design and construct field connections as indicated on approved submittals. Fit pieces together as required. Joints shall be firm when assembled. Conceal joining, fitting and welding on exposed work. Do not show rivets and screws on the exposed face. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.
- G. Miscellaneous Items: Fabricate items not specifically mentioned according to the drawings, approved shop drawings, and as required to complete the entire work. Galvanize exterior items and shop prime interior items unless otherwise shown or specified.



- H. Provide metal fabrications indicated, specified, and required to complete the work, including anchors and supports. Include parts necessary to complete metal fabrication work whether or not specifically indicated.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- J. For fabrication of metal work which will be exposed to view in finished work, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, mill scale, rolled trade names and roughness.
- K. Close fit exposed joints to hairline joints. Cut off exposed bolts and screws flush with adjacent metal. Cut, drill punch and tap as required for installation and attachment of other work to metal work.
- L. Form metal work with anchorage when built into concrete or masonry or provide with suitable anchors, expansion shields, or other anchoring devices indicated or required. Provide such metal work in ample time for setting and securing in place.
- M. Make threaded connections up tight so threads are entirely concealed. Provide Phillips flat head countersunk bolts and screws in exposed work and elsewhere required, unless otherwise indicated.
- N. Miscellaneous Framing and Supports:
  - 1. Provide miscellaneous steel framing and supports which are not a part of the structural steel framework, as required to complete this work.
  - 2. Fabricate miscellaneous units to the sizes, shapes and profiles shown, or if not shown, of the necessary dimensions to receive adjacent grating, plates, doors or other work to be retained by the framing.
  - 3. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars of welded construction using mitered corners, welded brackets and splice plates and a minimum number of joints for field connections.
  - 4. Equip units with integrally welded anchor straps for casting into poured concrete wherever possible.
  - 5. Except as otherwise shown, space anchors 2 feet o.c. and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.
  - 6. Galvanize exterior miscellaneous frames and supports.
- O. Galvanizing: Provide the hot-dip process in accordance with ASTM A123. Galvanize specified items after fabrication is completed and produce coating free of roughness, whiskers, unsightly spangles, icicles, runs, barbs, sags, droplets, and other surface blemishes.
- P. Shop Painting:
  - 1. Shop paint metal work specified in this section except those members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, galvanized and stainless steel surfaces.
  - 2. Remove loose mill scale, loose rust, oil, grease, and other deleterious materials before applying shop coat.
  - 3. Immediately after surface preparation, brush or spray primer paint. Apply in accordance with the manufacturer's instructions at a rate to provide a uniform dry film thickness of 1.0 mil for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
  - 4. Apply one shop coat of primer paint to fabricated metal items, except apply two coats of paint to surfaces which are inaccessible after assembly or erection.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine building construction that is to receive this work. Do not proceed with installation until conditions are suitable.

#### 3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Grouting: Provide grouting for work of this section as shown, specified, and required. Use non-shrink grout and conform to manufacturer's directions.
- B. Galvanizing Repair: Wire brush welds and damaged coating to clean bright metal. Apply one coat of galvanizing repair paint where surfaces are concealed or are to be finish painted. Use the specified hot-applied galvanizing repair compound where surfaces remain exposed and unpainted.
- C. Shop Prime Coat Repair: Do not apply metal primer in wet weather unless steel is protected from dampness and is dry. Clean field welds, field bolts, and damaged shop primer after erection and apply a spot coat of the same primer used for the shop coat.
- D. Fasteners: Provide fasteners and connectors of approved types as required for the installations, whether or not indicated. Provide galvanized fasteners for galvanized items and for exterior use. Fasten metal work to solid masonry with expansion bolts and to hollow masonry with toggle bolts. Provide screws threaded full length to screw head.
- E. Protection of Dissimilar Materials: Protect aluminum from contact with dissimilar materials by painting the contact surfaces of each with two heavy coats of bituminous paint, or by suitable isolation gaskets, as approved and as applicable for each condition.
- F. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- G. Items set into concrete or masonry. Provide temporary bracing for such items until concrete or masonry is set. Place in accordance with setting drawings and instructions. Build strap anchors, into masonry as work progresses. Set frames flush with finish floor or wall surface and, where applicable, flush with side of opening.
- H. Fastening: Field weld in accordance with AWS. Design and finish as specified for shop welding. Use continuous weld unless specified otherwise. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- I. Spot prime abraded and damaged areas of zinc coating as specified and abraded damaged areas of shop prime coat with same kind of paint used for shop priming.

#### 3.03 INSTALLATION OF CHANNEL AND ANGLE FRAMES

- A. Secure clip angles at bottom of door frames to concrete slab with expansion bolts as shown. Level and plumb frame; brace in position required. At masonry, set frames in walls so anchors are built-in as the work progresses unless shown otherwise. Set frame in formwork for frames cast into concrete. Where frames are set in prepared openings, bolt to wall with spacers and expansion bolts.

3.04 BUILT-IN ANCHORAGE

- A. Provide bolts, eyebolts, dowels, anchors, plates, Unistruts, inserts and other miscellaneous steel fastenings that are to be installed in concrete forms.

3.05 SCHEDULE OF ITEMS

- A. Pipe Railings: Railings and supports shall withstand a concentrated load of not less than 200 pounds applied at any point, downward or horizontally and uniformly distributed load of not less than 50 pounds per lineal foot applied downward or horizontally. Fabricate of steel pipe, not lighter than Schedule 40, with joints mitered at angles and coped at intersections unless otherwise shown, and continuously welded, welds ground smooth and flush. Provide cast malleable steel brackets with mounting plates for railings on walls. Return exposed rail ends to within 1/2" of walls unless otherwise shown. Provide removable sections where indicated.
  - 1. Exterior Post Anchors: Fabricate or pipe sleeves with closed ends or plates as shown. Where inserts interfere with reinforcing bars, provide flanged fittings welded or threaded to posts for securing to concrete with expansion bolts. Provide heavy pattern sliding flange base plate with set screws at base of pipe or tube posts. Base plates are not required on pipe sleeves where ornamental railings occur.
  - 2. Finish:
    - a. Interior: Shop prime coat.
    - b. Exterior: Hot dip galvanize after fabrications.
- B. Handrails: Close free ends of rails with flush metal caps welded in place except where flanges for securing to walls with bolts are shown. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.
  - 1. Elevator Entrance Wall Openings: Fabricate of channels shapes, plates, and angles as shown, and as specified above. Weld or bolt head to jamb as shown. Weld clip angles to bottom of frame and top of jamb members extended to structure above for framed construction. Provide holes for anchors. Weld to jamb members.
  - 2. Provide supports for guide rail bracket attachment in pit, at each floor and top of hoistway. Provide intermediate rail bracket supports to maintain a maximum spacing between brackets of not more than 12'-10" vertically. Supports shall be within 12" of the clear hoistway rail and located on centerline of the car rail.
  - 3. Elevator Threshold Angles: Sizes and connections shown.
  - 4. Screen: Fabricate of 1-1/2" diamond mesh 10-gauge woven wire fabric, with frames of 1" steel channels and shapes, frame joints full welded and ground smooth or mortised and tenoned and peen riveted, mesh wires extended through holes in frames, clinched, and spot welded at 6" intervals.
- C. Steel channel and angle frames for doors, duct openings, scuttles, mechanical equipment, louvers and other frames as shown and detailed of structural shapes shall be neatly fabricated to the exact size required and in accordance with approved shop drawings. Corners shall be neatly joined, welded and ground smooth. Concealed anchors for securing to concrete or masonry shall be welded on the back. Wherever required, steel frames shall be prepared to receive the necessary hardware. Provide galvanized sheet metal guards behind hardware attachment points. Where mechanical equipment such as fans, blowers, etc., and sheet metal are shown or specified to be attached to steel frames, the drilling, tapping, and attachment will be done as part of the work of the section in which the items are specified. Frames shall be galvanized where embedded in concrete or masonry.

- D. Pipe Bollards: Provide bollards of 8" diameter steel pipe welded to steel baseplates, and with top edges ground smooth. Galvanize after fabrication. Securely anchor to substrate as indicated. Anchor chain to eye bolts welded to bollards. Fill with 2,000 psi concrete domed to shed water.
- E. Removable Pipe Bollards: Provide sleeves with steel baseplates. Top of sleeve shall be inside threaded for plug. Provide removable pipe bollards with edges smooth and with top fitted with welded cap. If inside diameter of sleeve and outside diameter of bollard allow too loose a fit, weld a sleeve to bottom of bollard of diameter to provide snug, but removable fit. Galvanize after fabrication. Provide chains in lengths as required to reach from bollard to bollard with some slack. Provide 2 eye bolts welded to each bollard for attachment of chains. Chains will be secured with padlocks furnished by Owner. Provide brass or cast iron plug for each sleeve with special tool for plug removal.
- F. Steel Backing Plates:
  - 1. Backing plates in connection with studs and furring necessary for engaging and fastening of wall hung items shall be provided in locations shown and as necessary. Backing plates shall be securely welded to steel studs supporting members in the required position.
  - 2. Finish: Shop prime coat.
- G. Mechanical Chase: Fabricate and install as shown on drawings. Provide welded-on anchor devices. Shop prime.
- H. Steel gates and fencing: Fabricate and install as shown on drawings. Galvanize and shop prime.
- I. Other items as shown and in accordance with reviewed drawings.

END OF SECTION 05 55 00

SECTION 06 10 00 – ROUGH CARPENTRY

1.1 GENERAL

- A. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Rough Carpentry, as indicated on the Drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
1. Rough Carpentry.
  2. Framing Hardware
- B. References:
1. Chapters 7 and 23, California Building Code.
  2. PS 1 - 09 – Construction and Industrial Plywood.
  3. WWPA – Western Lumber Grading Rules 2011 Edition, by Western Wood Products Association.
  4. APA – American Plywood Association Design/Construction Guide.
  5. AQMD – Local Air Quality Management District Regulations.
  6. AWPA – American Wood Preservers Association – Manual of Recommended Practice, C-1.
  7. WCLIB – West Coast Lumber Inspection Bureau Standard Grading Rules No. 17.
- C. Quality Assurance:
1. Rough Carpentry Lumber: Visible grade stamp on all products required.
  2. Grade Stamp: Provide grade stamp per WWPA or WCLIB standards
  3. Nailing guns and nails shall be approved by DSA.
- D. Delivery, Storage and Handling:
1. Do not deliver rough carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.
  2. Protect items from weather while stored at job site.

1.2 PRODUCTS

- A. Rough Carpentry Materials:
1. Structural and Framing Lumber: Douglas Fir Larch, surface four sides, graded in accordance with WCLIB standards, Grading and Dressing Rule No. 17.
    - a. Moisture Content: The moisture content of all wood members shall not exceed 19% before installation. It shall be the responsibility of the inspector to verify that the contractor has upplied lumber of the proper moisture content before installation. The use of a hand held moisture content meter is acceptable.
    - b. All Framing Lumber shall be Grade Stamped No. 1 unless noted otherwise
  2. Structural Plywood: Plywood shall be APA Rated as indicated on the Drawings in accordance with U.S. Product Standard PS 1-09, Structural 1 Rated Sheathing.
  3. Nails, Spikes and Staples: All nailing shall conform to California Building Code. Table 2304.9.1, Nailing Schedule. Pre-drill all nails 20d and larger where required to prevent splitting.
  4. Bolts, Nuts, Washers, Lags, Pins and Screws: Section 2304.9, CBC, sized as required on drawings to suit application, galvanized for exterior locations, high humidity locations and treated wood, plain finish for other interior locations.

5. Fasteners: Expansion shield and lag bolt type or powder actuated type for anchorage to solid masonry or concrete. Refer to Section 01455 for acceptable types and required testing.
6. Stock Framing Connectors: Comply with CBC Section 2304.9, CBC Provide nails fully driven in all holes in each face of connector.
  - a. Manufacturers: Simpson Strong Tie Co., Inc., San Leandro, CA, or approved equal.
7. Non-Stock Framing Connectors: As per details on drawings.
8. Preservative (pressure) Treated Lumber: Section 2303.1.8, California Building Code Conform to AWPA manual of recommended practice. Use preservative complying with LP-2 and LP-22. Conform to AQMD, Local Regulations.
  - a. Douglas Fir or Western Hemlock, used as required by Section 2303.1.8, California Building Code, shall conform to the following:
    - 1.1 Lumber shall be WWPA or WCLIB grade stamped.
    - 1.2 Lumber shall be No. 1 grade or better.

### 1.3 EXECUTION

#### A. Framing:

1. All work shall be accurately and neatly cut and fitted, nailed and bolted in place in the best workmanlike manner.
2. Bearing surfaces on which wood structural members are to rest shall be finished to give true even support.
3. Erect wood framing members true to lines and levels. Do not deviate from true alignment more than 1/4 inch.
4. Construct members of continuous pieces of longest possible lengths.
5. Construct and erect required headers and lintels.
6. Construct walls with studs of size and spacing indicated. Install single sill member at bottom and double plate at top unless otherwise detailed. Stagger upper and lower members of double plate with joints not less than 4 feet oc. Where sill or any wood member contacts concrete or masonry, install preservatively treated lumber.
7. Provide one row of solid blocking not less than 2 inch nominal thickness and same width of stud at mid height of wall. Fit snugly and attach with not less than two 16d nails at each end.
8. Install 3 studs at corners.
9. Conform to Section 2308.9.8, California Building Code where pipes penetrate sills or plates.
10. Cutting and Notching: Conform to Section 2308.9.10, California Building Code.
11. Bored Holes: Conform to Section 2308.9.11, California Building Code.
12. Notches and Holes: Conform to section 2308.10.4.2 CBC.

#### B. Subflooring:

1. Place floor sheathing with end joints staggered. Secure sheets over firm bearing. Maintain minimum 1/16 inch and maximum 1/8 inch spacing between joints of sheets. Place perpendicular to framing members.
2. Maintain surface flatness of maximum 1/8 inch in 10 feet.

#### C. Plywood Sheathing:

1. Thickness as indicated on the drawings.
2. Boundary Nailing: Not less than 3/8 inch from edge, spaced as specified on drawings.
3. Blocking: Panel edges shall bear on framing members and solid blocking.
4. Minimum Size Vertical Panel: 12 inches wide.

5. Minimum Size Horizontal Panel: 24 inches wide.
- D. Foundation Framing, Plates, Sills and Sleepers:
1. Preservative treated wood required.
- E. Horizontal Framing:
1. Bearing: 1-1/2 inch minimum on wood or metal, on masonry as detailed on drawings. Lay framing members with crown up.
  2. Lateral Support: Use solid blocking or other approved means.
  3. Lap joists a minimum of 3 inches when framed from opposite sides of a beam.
  4. Openings: Double joists required for trimmer and headers for openings 4 ft. or larger.
  5. Provide ties, purlins and blocking in conformance with Section 2308.8.5, California Building Code.
- F. Backing:
1. Provide backing as indicated on drawings to support electrical fixtures, fixed equipment, cabinets, grab bars, door stops and plates. Fasten securely to framing.
- G. Blocking:
1. Provide Fire Blocking as per CBC 718.2.

END OF SECTION 06100

SECTION 06 40 23 INTERIOR ARCHITECTURAL WOODWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Interior Architectural Woodwork, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Display Cases
  - 2. Glazing for Display Cases
  - 3. Hardware for Display Cases
  - 4. Hardwood Chair Rail
  - 5. Wood Handrail at
  - 6. Hardwood Panel and Base
  - 7. Hardwood Trim
- C. Related Sections include the following:
  - 1. Section 09 91 00 – Painting, Finish of Hardwood
  - 2. Section 12 32 16 – Plastic Laminate-Clad Casework
  - 3. Section 12 32 16 – Plastic Laminate-Clad Laboratory Casework
  - 4. Division 12 Section “Educational Casework” for standard of construction.

1.02 REFERENCES

- A. WI – Woodwork Institute.
- B. AWS – Architectural Woodwork Standards.

1.03 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.04 SUBMITTALS

- A. Product Data
  - 1. For each type of product indicated, including display case hardware and accessories.
  - 2. For each type of solid hardwood, plywood veneer, and adhesives.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
  - 1. Show details full size.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other sections.
  - 3. Show locations and sizes of cutouts and holes for grommets installed in architectural woodwork.



C. Samples:

1. Solid Hardwood.
2. Plywood Veneer.

D. LEED Submittals:

1. Product data for Credit EQ 4.1: For adhesives and sealants, certify each interior field-applied adhesive and sealant product meets the VOC limits.
  - a. Include manufacturer's product data sheet and Material Safety Data Sheet (MSDS) highlighting VOC content for each product.
2. Product data for Credit EQ 4.4: For composite-wood product, certify each composite wood product (plywood, soffits, MDF, particleboard, agriboard, etc.) contains no added urea-formaldehyde resins.
  - a. Include manufacturer's product data sheet highlighting urea-formaldehyde resin content for each product.
3. Certificates for Credit MR 7: Provide certificates of chain-of-custody certifying that specified certified wood products were made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".
  - a. Include statement indicating costs for each certified wood product.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

G. Qualification Data: For installer and fabricator.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

- F. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" article.

#### 1.07 PROJECT CONDITIONS

- A. Environmental limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels, during the remainder of the construction period.
- B. Field measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
  - 2. Established Dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

#### 1.08 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other sections to ensure that interior architectural woodwork can be supported and installed as indicated.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. General:
  - 1. Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
  - 2. Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood that has been certified in accordance with Forest Stewardship Council (FSC) "Principles and Criteria" and has received Chain-of-Custody Certification as certified by an accredited certification group such as Smartwood or Scientific Certification Systems (SCS).
  - 3. All composite wood products (plywood, particleboard, MDF, hardboard, agriboard, etc.) must contain no added urea-formaldehyde resins.
- B. Wood Species and Cut for Transparent Finish: Hardrock Maple.
- C. Wood Products: Comply with the following:

1. Recycled Content of Medium-Density Fiberboard and Particleboard: Provide products with an average recycled content so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 50 percent.
2. Hardwood Faced Panels Products: HPVA HP-1, made with adhesive containing no urea formaldehyde.
3. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
4. Particleboard:
  - a. ANSI A208.1, Grade M-2.
  - b. Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.

#### 2.02 VENEERED PLYWOOD FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 200.
- B. Location: See Interior Elevations.
- C. Grade: Premium.
- D. Lumber Species: Hardrock Maple.
  1. Grain Matching: Run and match grain vertically.
  2. Matching of Veneer Leaves: Book match.
  3. Veneer Matching within Panel Face: Balance and center match.

#### 2.03 DISPLAY CASE HARDWARE AND ACCESSORIES

- A. General: Provide display case hardware and accessory materials associated with display case cabinets.
  1. Glazing: 3/8" tempered glazing, clear.
  2. Hardware Specified is by CR LAURENCE
  3. Top and Bottom Rails: CRL 4" tapered door rails with lock, DR4TBBA38SL
  4. Rail Length: as per drawings
  5. Rail End Cap: CRL DREC4TBBA
  6. Lock: CRL mortise keyed cylinder DRA10BS
  7. Strike Plate CRL 777SPBS
  8. Hinges: top pivot CRL 1NT401 and bottom pivot CRL 8010SET
  9. Catch: Top Magnetic non-locking glass door catch by Monroe PMP #4FCW8

#### 2.04 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- C. VOC Limits for Installation Adhesives and Glues: For all interior field-applied adhesives, use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  1. Wood Glues: 30 g/L.

2. Contact Adhesive: 80 g/L.
3. Multipurpose Construction Adhesive: 70 g/L.

#### 2.05 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide premium-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Complete fabrication, including assembly, finishing and hardware application, to maximum extent possible before shipment to project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  1. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.

#### 2.06 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Wood Species and Cut: Hardrock Maple.
  1. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb ( to a tolerance of 1/8" in 96 inches ).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Touch up finishing work specified in this section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

END OF SECTION 06 40 23

SECTION 07 21 16 THERMAL BLANKET INSULATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Building Insulation, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Section includes: Batt insulation for thermal and acoustical purposes.
  - 1. Insulate at roof line
  - 2. Insulate at furred exterior walls
  - 3. Sound attenuation at interior walls
- D. Related Sections:
  - 1. Insulation of Pipes and Ducts: Division 15.

1.02 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's recommendations for handling, storage, and protection during installation.
- B. Deliver materials to project site in manufacturer's original packaging. Store materials off ground. Protect against weater, condensation, and damage. Immediately remove damaged material from project site.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Owens-Corning Fiberglass Corp. (OCF)
- B. Johns Manville Corp. (JM)
- C. U.S. Gypsum (USG)

2.02 MATERIALS

- A. Thermal Insulation: ASTM C665, Type 1, incombustible fiberglass batts or blankets, JM Fiber Glass Commercial Insulation, Non-Faced. Material shall be of sufficient thickness to provide insulation R-value as shown.
  - 1. Thermal Restistance: R-19 for walls and R-38 for ceiling
- B. Acoustic Insulation: ASTM C665, Type 1, incombustible fiberglass batts or blankets, USG "Thermafiber SAFB" or equal, 3-1/2" thick unless otherwise shown, Sound Control Batt.

- C. Miscellaneous Materials: Metal clips, retainer plates, zinc coated wires, adhesives or other devices for anchoring insulation to framing shall be types as recommended by insulation manufacturer and acceptable to the architect.
- D. Materials shall not exceed flame spread of 25 or smoke density of 450 when tested in accordance with ASTM E84.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine areas which receive insulation to insure protection against inclement weather during and after installation.
- B. Examine space allocated for insulation for proper depth to receive material.
- C. Correct unsuitable conditions before proceeding with insulation.

#### 3.02 INSTALLATION

- A. Fit installation snugly between framing.
- B. Maintain integrity of insulation over entire area to be insulated.
- C. Insulate small areas between closely spaced framing members.
- D. Carefully cut and fit insulation around pipes, conduits, and other obstructions.
- E. Do not compress insulation in excess of 10 percent.
- F. Extend insulation's full thickness over entire surface to be insulated.
- G. Thermal and Acoustic Insulation: Install between framing with a friction fit. Provide wires as required to prevent sagging. Place vapor barrier (facing) of thermal insulation towards inside of building.
- H. Safing Insulation: Install between structure members with friction fit and retainer plates.

END OF SECTION 07 21 16

SECTION 07 21 29 SPRAYED INSULATION

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Closed Cell Spray Foam Insulation.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 10 00 - Damp proofing and Waterproofing.
- C. Section 07 26 00 - Vapor Retarders.
- D. Section 07 50 00 - Membrane Roofing.
- E. Section 07 81 33 - Mineral-Fiber Fireproofing.
- F. Section 09 20 00 - Plaster and Gypsum Board.

1.3 REFERENCES

- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C 1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- F. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- G. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- H. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- I. ASTM D 1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- J. ASTM D 2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- K. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.



1.4 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for flame and smoke, concealment, and over coat requirements.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with a minimum of ten years experience manufacturing products in this section shall provide all products listed.
- B. Installer Qualifications: Products listed in this section shall be installed by a single organization with at least five (5) years experience successfully installing insulation on projects of similar type and scope as specified in this section.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship is approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Storage: Store materials in dry locations with adequate ventilation, protected from freezing rain, direct sunlight and excess heat and in such a manner to permit easy access for inspection and handling. Store at temperature between 55 and 80 degrees F (12.7 to 26.6 degrees C).
- C. Handling: Handle materials to avoid damage.

1.8 PRE-APPLICATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

- B. Do not apply insulation when substrate temperatures are under 40 degrees F (4.4 degrees C) prior to installation.
- C. Surfaces must be dry prior to application of spray foam. Excess humidity may cause poor adhesion, and result in product failure.
- D. To avoid overspray, product should not be applied when conditions are windy.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: CertainTeed Corp., Insulation Group, which is located at: 750 E. Swedesford Rd. P. O. Box 860 ; Valley Forge, PA 19482-0860; Toll Free Tel: 800-233-8990; Email: [request info \(building.solutions@saint-gobain.com\)](mailto:request info (building.solutions@saint-gobain.com)); Web: [www.certainteed.com/products/insulation](http://www.certainteed.com/products/insulation)
- B. Substitutions: Not permitted.

### 2.2 SPRAY FOAM INSULATION

- A. Insulation: HFC-blown type Closed Cell Foam: CertainTeed CertaSpray Closed Cell Foam is a medium-density, MDI-based polyurethane thermoset rigid foam. When CertaSpray A-side closed cell is mixed with CertaSpray B-side closed cell under pressure in a 1:1 volumetric ratio, they react and expand into a medium-density closed cell foam with an in-place core density of 1.9- 2.2 pcf:
  - 1. Physical and Mechanical Properties:
    - a. Core Density: 1.9-2.4 pcf when tested in accordance with ASTM D 1622.
    - b. Thermal Resistance (aged): 5.8 less than or equal to 2-1/2 inches / 6.4 when greater than 2-1/2 inches when tested in accordance with ASTM C 518 at 75 degrees F, (h-ft2- degrees F)/Btu.
    - c. Thermal Resistance (initial): 6.4 when tested in accordance with ASTM C 518 at 75 degrees F, (h-ft2- degrees F)/Btu.
    - d. Closed Cell Content: 88-95 percent when tested in accordance with ASTM D 2842.
    - e. Compressive Strength: Greater than 25 psi when tested in accordance with ASTM D 1621.
    - f. Tensile Strength: 23 psi when tested in accordance with ASTM D 1623.
    - g. Water Absorption: Less than 2 percent by volume when tested in accordance with ASTM D 2842.
    - h. Dimensional Stability: Less than 9 percent by volume when tested in accordance with ASTM D 2126 at 75 degrees F/95 percent RH, 28 Day.
    - i. Water Vapor Transmission: 1.3 perm/inch when tested in accordance with ASTM E 96.
    - j. Air Permeability: 0.013 when tested in accordance with ASTM E 283 at 1 inch thickness, L/s/m2.
    - k. Fungi Resistance: Pass, with no growth when tested in accordance with ASTM C 1338.
  - 2. Fire performance
    - a. Flame Spread: Less than 25 when tested in accordance with ASTM E 84.
    - b. Smoke: Less than 450 when tested in accordance with ASTM E 84.
  - 3. Thermal Performance (aged): Tested in accordance with ASTM C 518 and/or ASTM C 177 at 75 degrees F (24 degrees C) mean temperature.
    - a. Thickness 1 inch (25 mm), R-Value 5.8 (h-ft2-degreesF)/Btu (1.0 (m2-degreesC)/W).
    - b. Thickness 1-1/2 inches (38 mm), R-Value 8.7 (h-ft2-degreesF)/Btu (1.5 (m2-

- degreesC/W).
- c. Thickness 2 inches (51 mm), R-Value 11.6 (h-ft<sup>2</sup>-degreesF)/Btu (2.0 (m<sup>2</sup>-degreesC/W).
- d. Thickness 2-1/2 inches (64 mm), R-Value 16.0 (h-ft<sup>2</sup>-degreesF)/Btu (2.8 (m<sup>2</sup>-degreesC/W).
- e. Thickness 3 inches (76 mm), R-Value 19.2 (h-ft<sup>2</sup>-degreesF)/Btu (3.4 (m<sup>2</sup>-degreesC/W).
- f. Thickness 3-1/2 inches (89 mm), R-Value 22.4 (h-ft<sup>2</sup>-degreesF)/Btu (3.9 (m<sup>2</sup>-degreesC/W).
- g. Thickness 4 inches (102 mm), R-Value 25.6 (h-ft<sup>2</sup>-degreesF)/Btu (4.5 (m<sup>2</sup>-degreesC/W).
- h. Thickness 4-1/2 inches (114 mm), R-Value 28.8 (h-ft<sup>2</sup>-degreesF)/Btu (5.1 (m<sup>2</sup>-degreesC/W).
- i. Thickness 5 inches (127 mm), R-Value 32.0 (h-ft<sup>2</sup>-degreesF)/Btu (5.6 (m<sup>2</sup>-degreesC/W).
- j. Thickness 5-1/2 inches (140 mm), R-Value 35.2 (h-ft<sup>2</sup>-degreesF)/Btu (6.2 (m<sup>2</sup>-degreesC/W).
- k. Thickness 6 inches (152 mm), R-Value 38.4 (h-ft<sup>2</sup>-degreesF)/Btu (6.8 (m<sup>2</sup>-degreesC/W).

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that all exterior and interior wall, partition, and floor/ceiling assembly construction has been completed to the point where the insulation may correctly be installed.
- C. Verify that substrate and cavities are dry and free of any foreign material that will impede application.
- D. Verify that mechanical and electrical services in ceilings, walls and floors have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Mask and protect adjacent surfaces from overspray or dusting.

#### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Product must be installed according to local code, and must be applied by a qualified applicator.
- B. Apply insulation by spray method, to uniform monolithic density without voids.
- C. Apply to minimum cured thickness and minimum LTTR value as indicated on the Drawings.

- D. Apply insulation to seal voids at truss ends to prevent wind scouring of ceiling insulation.
- E. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage.
- F. Apply insulation to fill voids around accessible service and equipment penetrations.
- G. Do not install spray foam insulation in areas where it will be in contact with equipment or materials with operating temperatures of 180 degrees F (82 degrees C) or greater.
- H. Where building is designed to meet the specific air tightness standards of the Energy Star Program, apply insulation as recommended by manufacturer to provide airtight construction. Apply sealant to joints between structural assemblies as specified in Division 7.
- I. Coordinate installation of protective covering.
- J. Patch damaged areas.

3.4 FIELD QUALITY CONTROL

- A. Inspection will include verification of insulation and density.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 21 29

SECTION 07 54 19 FULLY-ADHERED PVC MEMBRANE ROOFING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Fully Adhered PVC Membrane Roofing, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide fully-adhered Fleece Backed 80 mil nominal reinforced PVC thermoplastic single ply system, over a light-weight insulating concrete substrate, utilizing heat-welded seams and prefabricated flashing accessories, PVC-coated sheet metal flashings where recommended by manufacturer and required for proper termination.
  - 2. Provide adhesives and fasteners.
  - 3. Provide PVC coated sheet metal flashing as required for a complete water tight membrane.
  - 4. Provide pre-formed heavy duty PVC walkway pads as supplied by roofing manufacturer, to all rooftop equipment.
  - 5. Provide primer for the surface of the lightweight insulating concrete with a light coating of water based latex adhesive at 300 sq ft per gal. Allow to dry prior to installation of roof system.
- C. Related Sections:
  - 1. Section 07 62 00 – Sheet Metal Flashing and Trim
  - 2. Section 22 00 00 – Plumbing, Roof Drains

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Base flashings and membrane terminations.
- C. Samples for Verification on the following products:
  - 1. 12-by-12 inch square of sheet roofing, of color specified, including T-shaped side and end lap seam.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that installer is approved, authorized, or licensed by manufacturer to install roofing system.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in “Performance Requirements” Article.
  - 1. Submit evidence of meeting performance requirements.
- F. Qualification Data: For installer and manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

- H. Research/Evaluation Reports: For components of membrane roofing system.
- I. Maintenance Data: For roofing system to include in maintenance manuals.

#### 1.03 QUALITY ASSURANCE

- A. This roofing system shall be applied only by a roofing contractor authorized by the manufacturer prior to bid. The roofing contractor shall have at least five (5) years of experience with the submitted manufacturer.
- B. Upon completion of the installation and the delivery to the manufacturer by the Applicator of a certification that all work has been done in strict accordance with the contract specifications and the manufacturer's requirements, an inspection shall be made by a Technical Representative of the manufacturer to review the installed roof system.
- C. There shall be no deviation made from the project specifications or the approved shop drawings without prior written approval by the Architect and the manufacturer.
- D. All work pertaining to the installation of the membrane and flashings shall only be completed by applicator personnel trained and authorized by the manufacturer in those procedures.
- E. Provide a copy of the roofing system manufacturer's inspection report of completed roofing installation.
- F. Regulatory Requirements: The applicator shall submit evidence that the proposed roof system meets the requirements of the applicable building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.
  - 1. Factory Mutual Research Corporation (FM) – Norwood, MA
    - a. Class 1-240
  - 2. Underwriters Laboratories, Inc. – Northbrook, IL
    - a. Class A assembly
- G. Coordination:
  - 1. Hold roofing pre-construction conference at project site not more than one week prior to beginning roofing.
  - 2. Attendance is mandatory for roofing sub-contractor, roofing foreman, and roofing manufacturer's representative.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
- B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of

moisture beneath the tarpaulin in certain weather conditions which may affect the ease of membrane weldability.

- D. All adhesives shall be stored at temperatures between 40° F (5° C) and 80° F (27° C).
- E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- F. All materials which are determined to be damaged by the Owner's Representative or the manufacturer are to be removed from the job site and replaced at no cost to the Owner.

#### 1.05 PROJECT CONDITIONS

- A. Weather limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.
- C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur the applicator shall provide the necessary equipment to dry the surface prior to application.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. The applicator is cautioned that certain membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with the membrane. The applicator shall consult the manufacturer regarding compatibility, precautions and recommendations.
- G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over felt or plywood over insulation board shall be provided for all new and existing roof areas which receive rooftop traffic during construction.
- H. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- I. The applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
- J. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off-site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State, and Federal requirements.
- K. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the applicator and properly transported to a legal dumping area authorized to receive such material.

- L. The applicator shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
- M. Flammable adhesives shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.
- N. All rooftop contamination that is anticipated or that is occurring shall be reported to the manufacturer to determine the corrective steps to be taken.
- O. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition, in writing, for correction at the Owner's expense (letter copy to the manufacturer).
- P. Site cleanup, including both interior and exterior building areas which have been affected by construction, shall be completed to the Owner's satisfaction.
- Q. The applicator shall conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to help verify condition of deck/substrate and to confirm expected pullout values.
- R. The adhered membrane shall not be installed under the following conditions without consulting the manufacturer technical department for precautionary steps:
  - 1. The roof assembly permits interior air to pressurize the membrane underside.
  - 2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
  - 3. The wall/deck intersection permits air entry into the wall flashing area.
- S. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.
- T. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

#### 1.06 WARRANTIES

- A. Manufacturer's System Warranty (only products purchased from the manufacturer are covered under System Warranty).
  - 1. Upon successful completion of the work to the manufacturer's satisfaction and receipt of final payment, a twenty (20) year Full System, Non-Prorated, No Dollar Limit (NDL) Warranty shall be issued, including the labor and all components that comprise a roof system. Ponding water on the roof, without time limit, shall not be excluded from the warranty.
- B. Applicator/Roofing Contractor Warranty
  - 1. The applicator shall supply the Owner with a separate two-year workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the applicator warranty term, defective or otherwise not in accordance with the contract documents, the applicator shall repair that defect at no cost to the Owner. The applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer.
- C. Owner Responsibility: The Owner shall notify both the manufacturer and the applicator of any leaks as they occur during the time period when both warranties are in effect.



## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:
1. SP8PA Johns Manville Fully-Adhered PVC Roof System or equal.
  2. Alternate manufacturers meeting quality assurance requirements and having products with equal or better properties may be acceptable subject to approval.

### 2.02 MATERIALS

- A. Adhesives: PVC Membrane Adhesives.
1. Field Membrane: Latex PVC Membrane adhesive. Supplied and guaranteed by primary roofing membrane manufacturer.
  2. Parapet: California State approved low VOC Solvent-Based PVC Membrane Adhesive. Supplied and guaranteed by primary roofing membrane manufacturer.
- B. Membrane Roofing:
1. Cover areas with fully-adhered roof system. Seams shall be completed only by heat-welding in strict compliance with manufacturer's published recommendations. Flashings shall be / or equal to Johns Manville PVC Membrane or PVC-Clad Metal as required and illustrated in Johns Manville's published specifications.
  2. Membrane: 80 mil white polyester reinforced PVC with a polyester fleece heat-laminated on the underside. Color: White. Comply with ASTM D-4434, Type III. Johns Manville PVC 80 Fleece Membrane or equal.
  3. Field seams shall be heat welded.
- C. Base Flashing:
1. Flashings shall be / or equal to Johns Manville PVC reinforced 80 mil field membrane along with the appropriate manufacturers accessories. Pre-formed inside and outside corners are required.
  2. Pipe Boots shall be Johns Manville PVC Vent Pipe Boots or equal.
  3. Adhesives and miscellaneous sealants should be used as called for in the manufacturer's specifications.
- D. Roof Walk: Preformed, heavy-duty PVC walkway pads as supplied by roofing manufacturer.
- E. Pitch Pans / Filler: Johns Manville pre-formed UltraGard PVC Pitch Pans and Pourable Sealer.
- F. Expansion Joints: Construct per manufacturer's published details using a polypropylene rod that measures 1-inch larger than the maximum joint opening.
- G. Roof Drains: Drain flashing shall be a target made of field-welding two pieces of JM SR-60 PVC membrane solidly to each other, and then installed per published JM flashing details for roof drains.
- H. All other materials not specifically described, but required for a complete and proper installation of roofing, shall be selected by approved manufacturer and subject to approval of Architect/Owner.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
  - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
  - 3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors, and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Make sure that all counterflashing receivers, curbs, etc., are constructed in such a manner as to provide a minimum 8-inch base flashing height measured from the finished roof's surface to the top of the base flashing membrane.
- E. Spray or roll a light covering of Latex PVC Membrane Adhesive applied at 1 gal. for every 300 sq. ft. over entire surface of substrate. Allow to dry prior to membrane application.

#### 3.03 MEMBRANE INSTALLATION

- A. At end of each day's work, protect installed roofing by closing off edge of system with water cut-off.
- B. Remove water cut-off sealants completely and clean prior to resuming roofing application.
- C. Allow field sheets to relax for a minimum of 30 minutes before securing membrane.
- D. Starting at low edge of roof, begin applying the sheets in adhesive per manufacturer's requirements. Field laps shall be constructed to that a minimum 1.5-inch lap can be continuously heat-welded. Edges where the reinforcing membrane has been cut shall be covered with Seam Sealant the same day.
- E. Roll membrane into adhesive using a carpet-wrapped turf roller, taking care not to change direction of roller while on field membrane to avoid wrinkling and membrane damage.
- F. At all intersections with vertical walls, curbs, etc., and at all penetrations (drains, pipes, etc.) secure the membrane using No. 15 Johns Manville High Load Fasteners with (2) 3/8-inch round, barbed

galvanized steel discs. UltraGard High Load Plates. Cover fasteners with a heat-welded membrane as prescribed above.

- G. Johns Manville fully-adhered PVC system specification shall be an integral part of this specification.
- H. Quality Control of Seams: All seams must be checked for integrity with a blunt-ended probe. Any openings or “fishmouths” shall be repaired with a hand-held hot air tool fitted with a narrow nozzle tip and with a roller. Each day, several sections of seams welded that day shall be pulled apart by the roofing contractor to test the quality of welds. Should the welds be deficient (i.e., the weld pulls apart rather than the sheet coming apart), a more thorough examination of the work performed must be carried out and necessary repairs made.

### 3.04 FLASHING INSTALLATION

- A. Preparation: Inspect walls, curb heights, counterflashings, etc., and check for conformance with minimum base flashing height of eight (8) inches. Non-conforming areas must be corrected prior to installation of flashing.
- B. All metal edging, scuppers and overflows must be constructed with PVC-clad metal. All PVC-clad metal shall be fabricated to form hemmed edges to prevent sharp metal edges from cutting the membrane, except when in conjunction with wood nailers.
- C. Membrane flashings shall be fully-adhered using approved PVC Membrane Adhesive. All wall and curb flashings shall be secured at their top edge in strict accordance with Johns Manville Flashing Specifications.
- D. Any substrates that have asphalt contamination shall be isolated from the new roof system using PVC-coated metal base flashing or Invinsa cover board.
- E. Install flashing in accordance with roofing manufacturer’s specification.
- F. All pipes shall be flashed with Johns Manville’s Vent Pipe Flashing Boots or equal.

### 3.05 WALKWAY INSTALLATION

- A. Walkway: Install PVC Walkway material over clean, dry surfaces. Lay out areas where material is to be installed with most of the material oriented so that it is placed between field seams. Heat weld a 1.5-inch perimeter of the pad. Check seams for voids that might prevent watertightness.

### 3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Roof Inspection: Arrange for roofing system manufacturer’s technical personnel to inspect roofing installation and submit report to Architect.
  - 1. Have an authorized representative of manufacturer supplying the roofing system perform two (2) In-Progress Inspections and provide written confirmation.
  - 2. Additionally, authorized representative of manufacturer supplying the roofing system shall perform a Final Inspection in the presence of the Owner’s representative and provide written confirmation.
- C. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

- D. Additional testing and inspecting, at contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.07 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 19

SECTION 07 62 00 SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Sheet Metal, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Section includes flashing and sheet metal, including but not limited to the following:
  - 1. Sheet metal flashings in connection with roofing.
  - 2. Miscellaneous metal flashing and counterflashing as required
  - 3. Coping caps.
  - 4. Sheet metal covers on equipment platforms.
  - 5. Shop priming and field touch-up.
  - 6. Caulking.
- D. Related Sections:
  - 1. Roof Accessories: Section 07 63 00.
  - 2. Metal Fabrications: Section 05 55 00.

1.02 SUBMITTALS

- A. Shop Drawings and Data: For specially fabricated items, show layout dimensions, details and methods at joined and formed sections. Provide catalog cuts for manufactured items.

1.03 QUALITY ASSURANCE

- A. Comply with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.

PART 2 - PRODUCTS

2.01 BASIC MATERIALS

- A. Sheet Metal:
  - 1. Galvanized Sheet Steel: ASTM A653, coating class G90. Minimum gauge, unless otherwise specified, 24 gauge. All exposed sheet metal shall have a factory applied finish selected from standard colors.
- B. Sheet Lead:
  - 1. Federal Spec QQ-L-201f. Lead Sheet. Minimum thickness: 4 lbs/sf or 1/16". Use 50/50 solder and neutralize flux at all soldered joints. Use bituminous protection coating when placed adjacent to uncured concrete.
- C. Sheet Metal Fasteners:

1. Rivets, nails, sheet metal screws, machine screws, self-tapping screws, and stove bolts, of types and size best adapted to the conditions of use. Use galvanized, cadmium-plated or 300 series stainless steel.
  2. Pop rivets, closed-end type, by USM Corp., may be used for metal to metal connections where future disassembly is not required.
- D. Solder: ASTM B32.
- E. Flux: Raw muriatic acid.
- F. Sealant: Single-component nonsag polyurethane or silicone, as specified in Section 07 9200.
- G. Felt: ASTM D226, 15-pound type.
- H. Primer: Approved brand of zinc-dust zinc-oxide primer per Section 09 91 00 with manufacturer's pretreatment materials.

## 2.02 FABRICATION

- A. Workmanship:
1. Select methods of fabrication, assembly and installation. Fabricate in accordance with the best trade practices with joints and corners accurately machined, filed and fitted, and rigidly framed together and connected. Match components to produce perfect continuity of line and design
  2. Make joints and connections in exterior face of metal watertight.
  3. Make hairline joints in face of metal in contact except where shown or required for expansion of fitting.
  4. Conceal fastenings except as otherwise shown. Conceal reinforcement within the finished assembly.
  5. Seal reglets with removable filler to prevent intrusion of foreign substances.
- B. Soldering:
1. Clean material and tin prior to soldering. Solder with heavy coppers of blunt design, properly tinned before use.
  2. Solder slowly with well heated coppers. Heat the seams thoroughly and completely fill with solder. Exposed soldering with finish surfaces shall be neatly made full flowing and smooth.
  3. Wash acid flux with soda solution after soldering and remove soldering flux on exposed and painted surfaces.
- C. Expansion and Contraction:
1. Provide for thermal expansion and contraction, and building movement in completed work, without overstressing the material, breaking connections or producing wrinkles and distortion in finished surfaces. Make water and weather tight.
  2. Where subject to thermal expansion and contraction, attach members with clips to permit movement without damage or provide slotted or oversize holes with washers only, as acceptable.
  3. Make lock seam work flat and true to line and sweat full of solder except where installed to permit expansion and contraction.
    - a. Flat lock seams and lap seams, where soldered, shall lap according to pitch, but in no case less than three inches.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are smooth and clean to extent needed for sheet metal work.
- B. Verify that reglets, nails, cants, and blocking to receive sheet metal are installed and free of concrete and soil.
- C. Correct unsuitable conditions prior to installation.

3.02 PREPARATION

- A. Before installing sheet metal, verify shapes and dimensions of surface to be covered.

3.03 INSTALLATION

- A. Install metal items as indicated, according to approved submittals, and as required to complete the entire work. Securely fasten and assemble, and make watertight and weather tight.
- B. Coordination: Coordinate sheet metal items in connection with roofing for proper installation and furnish in sufficient time to avoid delay in roofing construction. Install roofing sheet metal simultaneously with roofing.
- C. Caulking: Provide sealant caulking as indicated and as required to seal and complete work of this section. Conform to Section 07 92 00.
- D. Protection from contact with dissimilar materials:
  - 1. Metal surfaces: Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.
  - 2. Wood or other absorptive materials: Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.
- E. Expansion and contraction: Provide expansion and contraction joints at not more than 30-foot intervals. Where the distance between the last expansion joint and the end of the continuous run is more than half the required interval, an additional joint shall be provided. Space joints evenly.

3.04 SPECIFIC ITEMS

- A. Coping Caps:
  - 1. Fabricate from 24 gauge galvanized sheet steel, continuous cleats. Use materials with factory finish to be selected from standard colors.
  - 2. Provide loose lock seams not to exceed 24 feet o.c. to allow for expansion.
  - 3. Intermediate and End Joints: Lock-seam and solder.
  - 4. Expansion Joint Locks: Fill with sealant.
- B. Drip Flashings: Provide at heads of windows, window sills, and doors. Use material compatible with window and frame materials. Coordinate installation of flashing with that of windows and doors. Provide hemmed, exposed edges in 1-piece lengths. Color shall match frame color and finish.

END OF SECTION 07 62 00



SECTION 07 63 00 ROOF ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Roof Hatch, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Related Sections:
  - 1. Fully-Adhered PVC Membrane Roofing: Section 07 54 19.
  - 2. Finish Painting: Section 09 91 00.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND TYPES

- A. Roof hatch shall be sized at 36” by 48”, and have a single side-hinged, spring-assisted door. The hatch installation shall include a safety railing system as described below.
- B. Acceptable Roof Hatch Manufacturers:
  - 1. Dur-Red.
  - 2. Or equal
- C. Acceptable Safety Railing System Manufacturers:
  - 1. KeeHatch Railing System (877-723-3766)
  - 2. Nystrom Safety Railing System (800-547-2635)

2.02 FABRICATION

- A. Cover – Galvanized Steel, Prime Painted: 14 gauge with three inch beaded flange, neatly welded. One inch thick glass fiber insulation in cover, fully covered and protected by a 22 gauge liner.
- B. Curb: Eight inch minimum, in-height, fabricated from 14 gauge galvanized steel, prime painted. Form curb with a 3-1/2” flange.
  - 1. Equip with an integral metal cap flashing, same gauge and material as curb, continuously weld at corners to insure water tightness. One inch thick rigid fiberboard insulation at exterior of the curb.
- C. Roof Hatch: Completely assembled with heavy pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles and padlock hasps inside and outside, and neoprene draft seals.
  - 1. Equip cover with an automatic hold-open arm complete with red vinyl grip handle to permit easy, one-hand release.
  - 2. Hardware Finish: Zinc-coated in accordance with manufacturer’s standards.

- D. Safety Railing System: Shall comply with OSHA Standards #1910.23 and 1910.27. Railing system shall consist of a top-rail, mid-rail, and chain or swinging gate, with the hatch curb acting as the toe plate. Railing system shall extend to a height of at least 42 inches from the finished roof deck and be free of sharp edges and snag points. Product label shall include easy reading "NO HOISTING" warning along with manufacturer's identification and patent label. Provide seven year manufacturer's warranty.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install hatch assemblies over roof openings.
- B. Attach to building structure in compliance with manufacturer's installation instructions. Flash to produce a water and weather tight installation.

END OF SECTION 07 63 00

SECTION 07 84 00 FIRESTOPPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Firestopping, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. General Description of the work of this section:
  - 1. Only tested firestop systems shall be used in specific locations as follows:
    - a. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
    - b. Safing slot gaps between edge of floor slabs and curtain walls.
    - c. Openings between structurally separate sections of wall or floors.
    - d. Gaps between the top of walls and ceilings or roof assemblies.
    - e. Expansion joints in walls and floors.
    - f. Openings and penetrations in fire-rated partitions or walls containing fire doors.
    - g. Openings around structural members which penetrate floors or walls.
- D. Related Sections
  - 1. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
    - a. Section 03 31 13 – Structural Concrete
    - b. Section 04 05 13 – Mortar and Grout
    - c. Section 04 22 00 – Concrete Unit Masonry
    - d. Section 07 92 00 – Joint Sealers
    - e. Section 09 24 00 – Portland Cement Plaster
    - f. Section 09 29 00 – Gypsum Board
    - g. Section 21 13 13 – Wet-Pipe Sprinkler Systems
    - h. Section 22 00 00 – Plumbing
    - i. Section 23 00 00 – Heating, Ventilating, and Air Conditioning
    - j. Section 26 05 00 – Common Work Results for Electrical
    - k. Section 28 31 00 – Fire Alarm

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.03 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"

- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"
- D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
  - 1. UL Fire Resistance Directory:
    - a. Firestop Devices (XHJI)
    - b. Fire Resistance Ratings (BXRH)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Voids, or Cavity Material (XHHW)
    - e. Forming Materials (XHKU)
    - f. Joint Systems (XHBN)
    - g. Perimeter Fire Containment Systems (XHDG)
  - 2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- J. California Building Code
- K. NFPA 101 - Life Safety Code
- L. NFPA 70 - National Electric Code

#### 1.04 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 01 33 00.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

#### 1.05 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

- B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

#### 1.07 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

#### 1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per

specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

## PART 2 - PRODUCTS

### 2.01 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

### 2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XH DG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:
  - 1. Hilti, Inc., Tulsa, Oklahoma, 800-879-8000/www.us.hilti.com
  - 2. Provide products from the above acceptable manufacturer; no substitutions will be accepted.

### 2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Cast-in place firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and cable bundles penetrating concrete floors, the following products are acceptable:
  - 1. Hilti CP 680 Cast-In Place Firestop Device
    - a. Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
  - 2. Hilti CP 681 Tub Box Kit for use with tub installations.
  - 3. Hilti CP 682 Cast-In Place Firestop Device for use with noncombustible penetrants.
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
  - 1. Hilti FS-ONE Intumescent Firestop Sealant
  - 2. Hilti CP 604 Self-leveling Firestop Sealant
  - 3. Hilti CP 620 Fire Foam
  - 4. Hilti CP 606 Flexible Firestop Sealant
  - 5. Hilti CP 601s Elastomeric Firestop Sealant
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Firestop Sealant
  2. Hilti CP 606 Flexible Firestop Sealant
  3. Hilti FS-ONE Intumescent Firestop Sealant
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti CP 672 Speed Spray
  2. Hilti CP 601s Elastomeric Firestop Sealant
  3. Hilti CP 606 Flexible Firestop Sealant
  4. Hilti CP 604 Self-leveling Firestop Sealant
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. Hilti CP 777 Speed Plugs
  2. Hilti CP 767 Speed Strips
- G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
- H. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
  2. Hilti CP 620 Fire Foam
  3. Hilti CP 601s Elastomeric Firestop Sealant
  4. Hilti CP 606 Flexible Firestop Sealant
- I. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Firestop Putty Stick
  2. Hilti CP 658T Firestop Plug
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CP 617 Firestop Putty Pad
- K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 643N Firestop Collar
  2. Hilti CP 644 Firestop Collar
  3. Hilti CP 645/648 Wrap Strips
- L. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti CP 637 Firestop Mortar
  2. Hilti FS 657 FIRE BLOCK
  3. Hilti CP 620 Fire Foam
  4. Hilti CP 675T Firestop Board
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
  2. Hilti CP 675T Firestop Board
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti CP 672 Speed Spray
  2. Hilti CP 601s Elastomeric Firestop Sealant
  3. Hilti CP 606 Flexible Firestop Sealant
  4. Hilti CP 604 Self-Leveling Firestop Sealant
- O. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
  2. Hilti CP 658T Firestop Plug
- P. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- Q. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
1. Verify penetrations are properly sized and in suitable condition for application of materials.
  2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  5. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.



- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

### 3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
  - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
  - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
  - 3. Protect materials from damage on surfaces subjected to traffic.

### 3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

### 3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION 07 84 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Joint Sealants, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Exterior joints
  - 2. Interior joints

1.02 SUBMITTALS

- A. In addition to Product Data, submit the following:
  - 1. Samples of each type and color of joint sealant required.
  - 2. Test reports for joint sealants evidencing compliance with requirements.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Use sealants from the following types, as indicated on drawings or as appropriate to the joint being sealed. Refer to schedule for additional for additional approved applications.
  - 1. Type 1: One-part moisture curing Polyurethane sealant. FS TT-S-230C, Class A Type II, non-sag.
    - a. DYNATROL I, manufactured by Pecora Corporation, Harleysville, PA.
    - b. SIKAFLEX-1a, manufactured by Sika Corporation, Lyndhurst, NJ.
  - 2. Type 2: Multi-part Polyurethane Base. FS TT-S-227E, Class A, Type II, non-sag.
    - a. DYNATROL II, manufactured by Pecora Corporation, Harleysville, PA.
    - b. SIKAFLEX-2c, manufactured by Sika Corporation, Lyndhurst, NJ.
  - 3. Type 3: One-part moisture curing Polyurethane sealant. FS TT-S-230C, Class A, Type I, self-leveling.
    - a. UREXPAN NR-201, manufactured by Pecora Corporation, Harleysville, PA.
    - b. VULKEM 45, manufactured by Mameco International Inc., Cleveland, OH.
  - 4. Type 4: Multi-part Polyurethane Base. FS TT-S-227, Class A, Type I, self-leveling.
    - a. DYNATRED or UREXPAN NR-200, manufactured by Pecora Corporation, Harleysville, PA.
    - b. SIKAFLEX-2c S/L, manufactured by Sika Corporation, Lyndhurst, NJ.

5. Type 5: One part Silicone Sealant. FS TT-S-1543a, Type S, Class A, non-sag.
    - a. 863 ACETOXY Silicone Sealant, manufactured by Pecora Corporation, Harleysville, PA.
    - b. SCS 1200, manufactured by General Electric Co., Waterford, NY.
  6. Type 6: One-part, non-sag, acrylic latex sealing compound, ASTM C834, AC-20, manufactured by Pecora Corporation, Harleysville, PA.
    - a. ACRYLIC LATEX No. 834 manufactured by Tremco, Beachwood, OH.
  7. Type 7: One-part, non-sag, butyl rubber base acoustical sealant, ASTM C834, BA-98, manufactured by Pecora Corporation, Harleysville, PA.
    - a. SHEETROCK ACOUSTICAL SEALANT, manufactured by USG, Chicago, IL.
  8. Type 8: One or two part silicone sealant, FS TT 1543A, non-sag, neutral cure 756HP or 795 silicone building sealant, 791 perimeter sealant, manufactured by Dow Corning Corporation, Midland, MI.
  9. Type 9: One part structural glazing silicone sealant, FS TTS 1543A, Type 5, non-sag, neutral cure 795 silicone building sealant or 995 structural adhesive, manufactured by Dow Corning Corporation, Midland, MI.
  10. Type 10: One part mildew resistant fungicidal silicone sealant, FS TTS 1543C, Type 5, non-sag, neutral cure 786 mildew resistant silicone sealant, manufactured by Dow Corning Corporation, Midland, MI.
  11. Or approved equal.
- B. Accessories:
1. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
  2. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
  3. Joint Backing: ASTM D1056; round closed cell polyethylene foam rod; oversized 25% larger than joint width.
    - a. DENVERFOAM or GREENROD, manufactured by Pecora Corporation, Harleysville, PA.
    - b. SONOFOAM BACKER ROD, manufactured by Sonneborn Building Products, Minneapolis, MN.
  4. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application. Apply to bottom of joints which are too shallow to receive foam backer rod.
- C. Manufacturers:
1. Silicone Sealants:
    - a. Bostik Inc.
    - b. Dow Corning.
    - c. GE Silicones.
    - d. NUCO Industries, Inc.
    - e. Ohio Sealants, Inc.
    - f. Pecora Corporation.
    - g. Polymeric Systems, Inc.

- h. Sonneborn Building Products Div., ChemRex Inc.
      - i. Tremco.
  - 2. Urethane Sealants:
    - a. Bostik Inc.
    - b. Mameco International.
    - c. W.R. Meadows, Inc.
    - d. Pacific Polymers, Inc.
    - e. Pecora Corporation.
    - f. Polymeric Systems, Inc.
    - g. Sika Corporation.
    - h. Sonneborn Building Products Div., ChemRex Inc.
    - i. Tremco.
- D. 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 testing and field experience.
- E. Colors: Provide colors indicated for exposed joint sealants or, if not indicated, as selected by Architect from manufacturer's full range for this characteristic.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. General: Comply with joint sealant manufacturer's instructions for products and applications indicated.
- B. Sealant Installation Standard: Comply with ASTM C 1193.
- C. Acoustical Sealant Application Standard: Comply with ASTM C 919 for use of joint sealants in acoustical applications.
- D. Joint Sealant Schedule:
  - 1. Exterior Joints
    - a. Joints between metal frames and concrete or masonry: Sealant Type 1, 8, 9.
    - b. Joints between impervious metals: Sealant Type 1, 8, 9.
    - c. Vertical expansion and control joints: Sealant Type 2, 8.
    - d. Joints in sheet metal flashings: Sealant Type 2, 8.
    - e. Perimeters of window frames, door frames, louvers and similar openings, and where metal, wood or other materials abut or join masonry, concrete or each other: Sealant Type 1, 8.
    - f. Horizontal expansion, control and abutment joints in sidewalks, concrete floors: Sealant Type.
    - g. Joints where a self-leveling sealant cannot be used because of slope: Sealant Type 2.
    - h. Glass glazing, cap beads ( on glass ), to metal and surfaces made of a silica substance: Sealant Type 5, 8, 9.
  - 2. Interior Joints
    - a. Vertical expansion and control joints: Sealant Type 1.
    - b. Joints between impervious metals: Sealant Type 1.

- c. Horizontal expansion, control, isolation and abutment joints: Sealant Type 3 or 4.
- d. Window and door perimeters: Sealant Type 1.
- e. Gypsum Board Joints: Sealant Type 1.
- f. For sink, tub or bath areas including countertop joints: Sealant Type 5, 10.
- g. Other interior joints as indicated or shown: Sealant Type 1.
- h. Intersection of wall surface and cap strip at resilient flooring integral cove: Sealant Type 1.
- i. Intersection of metal thresholds and floor substrate, where building components are mechanically anchored and required sealing: Sealant Type 6.
- j. Perimeter of sound-rated walls, at intersection of gypsum board and abutting surfaces, both sides of wall: Sealant Type 7.

END OF SECTION 07 92 00

SECTION 08 11 13 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Steel Doors and Frames, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide hollow metal doors.
  - 2. Provide hollow metal door frames.

1.02 REFERENCES

- A. SDI – Steel Door Institute
- B. HMMA – Hollow Metal Manufacture’s Association
- C. SDI 100 – Recommended Specifications for Standard Steel Doors and Frames
- D. SDI 105 – Recommended Erection Standards for Steel Frames
- E. SDI 111 – Recommended Standard Details for Steel Doors and Frames
- F. SDI 117 – Manufacturing Tolerances Standard Steel Doors and Frames
- G. HMMA 810 – Hollow Metal Doors
- H. HMMA 820 – Hollow Metal Frames
- I. HMMA 830 – Hardware Preparation and locations for Hollow Metal Doors and Frames
- J. HMMA 840 – Installation and Storage of Hollow Metal Doors and Frames
- K. NFPA 80 – Fire Doors and Windows

1.03 SUBMITTALS: Submit as per Section 01 33 00.

- A. Submit shop drawings for frames indicating frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcements for hardware and finish.
- B. Submit shop drawings for doors indicating core material, location of cutouts for hardware, reinforcements for hardware and finish.
- C. Submit product date.
- D. Submit manufacturer’s installation instructions.

1.04 QUALITY ASSURANCE

- A. Frames and doors to conform to SDI and HMMA standards except where exceeded by this specification.
- B. Manufacturer: Company specializing in manufacturing the products specified in this section having minimum five years experience.

1.05 DELIVERY, STORAGE AND PROTECTION

- A. Deliver and protect doors and frames with manufacturer's shipping safeguards.
- B. Attach spreader bars on welded frames to preclude warping or bending during delivery and storage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
  - 1. Curries.
  - 2. Stiles.
  - 3. Ceco Door Products.
  - 4. Steelcraft.

2.02 FIRE-RATED DOOR ASSEMBLIES

- A. NFPA 80, identical to assemblies tested per ASTM E 152, and labeled and listed by UL

2.03 WELDED FRAMES

- A. Type: Combination buck frame and integral stop and flat trim, double rabbit profiles as indicated on the drawings. Cold rolled steel as per ASTM A336.
- B. Exterior Frames: 14 gauge
- C. Interior Frames: 16 gauge
- D. Provide profiles as per drawings.
- E. Anchors: Provide (2) anchors at head for openings up to 48 inches, maximum 30" on center. Provide (3) anchors per jamb for doors up to 84" in height, additional anchors at maximum 30" on center for higher doors.
  - 1. Provide appropriate type of anchors consistent with type of wall construction for each installation and in conformance with HMMA 820 and SDI 111.
- F. Floor Attachment: Provide metal anchor with provision for expansion anchor attachment to concrete floor.
- G. Hardware Attachment: Mortise, reinforce, drill and tap at factory to receive specified hardware. Install minimum 10 gage reinforcing welded to frame for typical surface mounted hardware. Install minimum 7 gage reinforcing for hinges in accordance with HMMA 820. Tap to templates.
- H. Galvanized: A-60.

2.04 WELDED FRAME FABRICATION

- A. Fabricate exterior welded steel frames as saw mitered and full inside welded unit type or machine-mitered and full welded unit type, in accordance with HMMA 820. Weld and grind smooth. No intermittent welds or plate splices permitted at intersections.
- B. Fabricate interior welded steel frames as machine mitered face-welded unit type in accordance with HMMA 820. Weld and grind smooth.
- C. Where cross mullions or T intersections occur, frames shall be fabricated as butted and face-welded assembly joints, in accordance with HMMA 820.
- D. Machine mitered faces and butt-joined integral stops permitted with continuous welds.
- E. Fabricate frames with hardware reinforcements plates welded in place.
- F. Fabricate frames to accept anchors as described in HMMA 820 and SDI 111 for type of wall construction.

2.05 EXTERIOR DOORS

- A. SDI 100 Level / Model: 3/2
- B. Door Thickness: 1 3/4"
- C. Face Skin: 16 gauge face sheets
- D. Material: Galvanized A-60
- E. Door Edges: 1/8" bevel on lock side
- F. Edge Construction: Continuous weld and ground smooth the full height of door, seamless.
- G. Core: Polyurethane
- H. Top Channel: 16 Gauge minimum. Provide flush top channel.
- I. Bottom Channel: 16 Gauge minimum.
- J. Size: As per drawings.
- K. Hinge Rail and Reinforcement: Full height channel, 14 gauge extruded to 10 gauge equivalent at tapped holes.
- L. Lock Rail: Full height channel, 14 gauge.
- M. Closer Reinforcement: 12 gauge.

2.06 INTERIOR DOORS

- A. SDI 100 Level / Model: 3/2
- B. Door Thickness: 1 3/4"
- C. Face Skin: 16 gauge face sheets



- D. Material: Galvanized A-60
- E. Door Edges: 1/8" bevel on lock side
- F. Edge Construction: Continuous weld and ground smooth the full height of door, seamless.
- G. Core: Polyurethane
- H. Top Channel: 16 Gauge minimum. Provide flush top channel.
- I. Bottom Channel: 16 Gauge minimum.
- J. Size: As per drawings.
- K. Hinge Rail and Reinforcement: Full height channel, 14 gauge extruded to 10 gauge equivalent at tapped holes.
- L. Lock Rail: Full height channel, 14 gauge.
- M. Closer Reinforcement: 12 gauge.

#### 2.07 DOOR FABRICATION

- A. Fabricate doors from cold rolled steel conforming to ASTM A366 or ASTM A527.
- B. Non-handed doors are not permitted.
- C. Hinge fillers are not permitted.
- D. Fabricate doors with cutouts sized for hardware and openings as indicated.
- E. Reinforce, drill and tap doors to receive mortise hinges, locks, latches, flush bolts and closures. Use reinforcing gauges as listed in Table V of SDI 100.

#### 2.08 PROTECTIVE COATING

- A. Frames: Pretreat and shop prime with modified alkyd, air dried conforming to ANSI-A224.1, approved primer. Series P10-1009, Gray, TNEMEC or equal.
- B. Doors: Pretreat and shop prime with modified alkyd, air dried conforming to ANSI-A224.1, approved primer. Series P10-1009, Gray, TNEMEC or equal.

#### 2.09 VISION LIGHT FRAMES

- A. Provided under Section 08 81 00.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

3.02 FRAME INSTALLATION

- A. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
  - 1. Install frames in accordance with HMMA 840 and SDI 105.
  - 2. Conform to standard of tolerances as required in HMMA 840 and SDI 117
  - 3. Coordinate anchor placement with type of wall construction.
  - 4. Install fire-rated frames according to NFPA 80, product UL listing and manufacturers recommendations.

3.03 DOOR INSTALLATION

- A. Fit hollow-metal doors accurately in frames.
  - 1. Install Doors in accordance with SDI 100.
  - 2. Fire-Rated Doors: Install fire rated doors according to NFPA 80, product UL listing and manufacturers recommendations. Install with clearances specified in NFPA 80.
  - 3. Smoke-Control Doors: Comply with NFPA 105.

END OF SECTION 08 11 13

SECTION 08 14 16 FLUSH WOOD DOORS

PART 1 – GENERAL

1.01 SUMMARY

- A. The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Flush Wood Doors, as indicated on the Drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Non-rated wood doors with prefinished flush faces.
  - 2. Fire-rated wood doors with prefinished flush faces.

1.02 REFERENCES

- A. NFPA-80 – Standards for Fire Doors Edition.
- B. AWI – Architectural Woodwork Institute.
- C. WDMA – Window and Door Manufacturers Association: IS 1-A Industry Standard for Architectural Flush Wood Doors.
- D. ANSI/NWMA I.S.1 – Industry Standard for Wood Flush Doors.
- E. ANSI A208.1 – Wood Particle Board.
- F. ASTM C612 – Mineral Fiber Block and Board Thermal Insulation.
- G. ASTM E152 – Fire Tests of Door Assemblies.
- H. California Building Code – Conform to Section 1005.8 for fire rated doors.
- I. Underwriters Laboratories – UL 10c, Positive Pressure Fire Door Test Method.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Submit shop drawings indicating door elevations and sections, materials, thickness, door swing, stile and rail dimensions, veneers, undercuts, storage and erection details, locations of finish hardware by dimension and locations / details of all openings.
- C. Do not proceed with any fabrication until all details are approved.
- D. Submit certification that doors and frames comply with UL10c, Positive Pressure Fire Door Test Method.
- E. Submit manufacturer's product data and installation instructions.
- F. Submit three samples of each door type specified, illustrating each face veneer and door construction specified.

1.04 WARRANTY

- A. Provide manufacturer's signed guarantee for all wood doors. Guarantee period: Lifetime of original installation. Door exhibiting defects in materials or workmanship within guarantee period shall be replaced (including hanging and finishing) with new doors. These terms shall be part of the manufacturer's standard warranty.
- B. Replace defective doors which have:
  - 1. Delamination in any degree.
  - 2. Warp or twist of 1/4" or more in any 3' – 6" x 7' plane of door face.

#### 1.05 QUALITY ASSURANCE

- A. Fire-Rated Wood Doors:
  - 1. Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies in accordance UL10c, Positive Pressure Fire Door Test Method and which are labeled and listed for ratings indicated by UL testing and inspection agency.
  - 2. Doors: Comply with UL10c where required.
  - 3. Provide smoke gaskets as required by manufacturers' individual authorities in compliance with UL10c.
  - 4. Conform to ASTM E152.
  - 5. Conform to NFPA 80 for fire rated class indicated.
- B. Provide doors from one manufacturer to ensure uniformity in quality of appearance and construction. All materials supplied for this project to conform to the AWI Section 200 and 1300 for custom wood doors.
- C. Wood door supplier to be a qualified direct distributor of products to be furnished.

#### 1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Protect doors during transit, storage and handling to help prevent damage, soiling and deterioration.
- B. Comply with manufacturer's instructions and with on-site-care requirements of AWI Section 1300-G-23 Care and installation at site.
- C. Deliver prefinished components in manufacturer's original unopened protective covering or container, clearly marked with manufacturer's name, brand name and identifying number on covering.
- D. Do not walk or stack other materials on top of stacked doors. Do not drag doors across one another.
- E. Exposed wood at tops, bottoms and cutouts for hardware and accessories shall be sealed prior to shipment.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. GRAHAM
  - 1. <http://www.grahamdoors.com>
- B. Acceptable Substitutions

1. Marshfield Door Systems
  - a. <http://www.marshfelddoorsystems.com>
2. VT Industries
  - a. <http://www.vtindustries.com>

## 2.02 STANDARD DOORS

### A. Interior Non-Rated Doors

1. Type: Graham GPD-PC.
2. Construction: 7-Ply Construction.
3. Thickness: 1-3/4 inches.
4. Core: Solid bonded particle core (PC).
5. Vertical Edges: Hardwood to match face veneer over structural composite lumber (SCL), glued to core.
6. Horizontal Edges: Structural composite lumber (SCL), glued to core.
7. Duty Level: Extra-Heavy Duty.
8. Adhesives: Type I per WDMA TM-6.
9. Facing:
  - a. Grade: Grade "A" per WDMA I.S. 1-A.
  - b. Adhesive Type 1
  - c. Thickness: 1/50" minimum at 12% moisture content after finish sanding.
  - d. Species: Hardrock Maple.
  - e. Cut: Plain Sliced.
  - f. Assembly: Book Match.
  - g. Symmetry: Running Match.

## 2.03 FIRE-RATED DOORS

### A. Interior 20-Minute Doors

1. Type: Graham GPD-PC.
2. Construction: 7-Ply Construction.
3. Thickness: 1-3/4 inches.
4. Core: Solid bonded particle core (PC).
5. Vertical Edges: Hardwood to match face veneer over structural composite lumber (SCL), glued to core.
6. Horizontal Edges: Structural composite lumber (SCL), glued to core.
7. Duty Level: Extra-Heavy Duty.
8. Adhesives: Type I per WDMA TM-6.
9. Facing:
  - a. Grade: Grade "A" per WDMA I.S. 1-A.
  - b. Adhesive Type 1
  - c. Thickness: 1/50" minimum at 12% moisture content after finish sanding.
  - d. Species: Hardrock Maple.
  - e. Cut: Plain Sliced.
  - f. Assembly: Book Match.
  - g. Symmetry: Running Match.

### B. Interior 60-Minute Doors

1. Type: Graham GPD-FD.
2. Construction: 7-Ply Construction.
3. Thickness: 1-3/4 inches.
4. Core: Bonded Fire Resistive Composite (FD) containing no asbestos.
5. Vertical Edges: Hardwood to match face veneer over fire resistive composite, glued to core.
6. Horizontal Edges: Fire resistive composite, glued to core.
7. Duty Level: Extra-Heavy Duty.
8. Adhesives: Type I per WDMA TM-6.
9. Facing:
  - a. Grade: Grade "A" per WDMA I.S. 1-A.
  - b. Adhesive: Type 1
  - c. Thickness: 1/50" minimum at 12% moisture content after finish sanding.
  - d. Species: Hardrock Maple.
  - e. Cut: Plain Sliced.
  - f. Assembly: Book Match.
  - g. Symmetry: Running Match.

#### 2.04 FABRICATION

- A. Fabricate wood doors in accordance with requirements of WDMA I.S. 1-A Quality Standards.
- B. Fabricate fire rated doors in accordance with requirements of Underwriters' Laboratories, with metal label on each door including UL-10c.
  1. Attach permanent metal fire rating label to door on top edge.
- C. Premachine doors at factory for finish hardware.
- D. Veneer: Face veneer grain shall run vertically.

#### 2.05 FINISH

- A. Provide factory applied finish as per manufacturer.

#### 2.06 VISION LITE FRAMES

- A. Provided under Section 08 81 00.
- B. Fire-rated doors: to have UL approved glazing system.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Adjusting:
  1. Adjust and check each door to ensure proper operating and function.
  2. Replace or rehang doors which are hinge bound and do not swing or operate freely. Replace or rehang doors which are warped, twisted or which are not in true planes.
- B. Fire doors and frames shall be installed in accordance with their listing, NFPA No. 80 and the manufacturer's instructions.

- C. Condition doors to average temperature and humidity in area of installation for not less than 48 hours prior to installation. Store doors per recommendations of WDMA I.S. 1-A, "Care and Installation at Job Site."
- D. Ensure that smoke gaskets are in-place before prefinished door installation.

3.02 PROTECTING AND CLEANING

- A. Clean prefinished doors and hardware per manufacture's recommendations.
- B. Protect doors as directed under Section 01 74 00.
- C. Replace prefinished doors damaged during installation.

END OF SECTION 08 14 16

SECTION 08 31 16 ACCESS PANELS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Access Door and Panels, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. The access panels for the entire work, and pertains to all sections for which access panels are furnished or required, unless specified otherwise.
- C. Related Sections:
  - 1. Painting: Section 09 91 00.
  - 2. Furnishing of access panels required for communication systems, fire sprinklers, electrical, plumbing, air conditioning and other work: Division 21, 22, 23 and 26.

1.02 SUBMITTALS

- A. Provide complete shop drawings and manufacturer's brochures for review. Provide complete list of access panels required for project showing location, size, surface on which installed and type of panel for wall application.
- B. Layout Drawings: Determine required access panels in finished surfaces, whether furnished under this section or as part of the work of Divisions 15 and 16. Provide layout drawings, using contract drawings as background, and show dimensioned locations of proposed access panels, the size of each panel, and installation detail for each panel. Obtain approval of locations prior to framing openings for panels.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide access panels in finish construction, where indicated on the architectural drawings, and wherever required for access to concealed mechanical and electrical equipment.
- B. Those panels required for access to equipment, but not shown on architectural drawings, shall be furnished as part of the work requiring the access. All access panels furnished under all sections of the specifications shall conform to the following requirements.

2.02 MATERIALS

- A. All materials shall conform to the following requirements and shall be of new stock, free from defects and imperfections, of recent manufacture and unused.
  - 1. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.



2. Where model numbers are indicated, if specified models are discontinued, the Contractor shall furnish the manufacturer's updated model.
- B. Access panels shall be steel, primed, to be of size required, a minimum of 12 inch by 12 inch size, or as indicated on drawings, and other sections of these specifications and, as manufactured by Inryco/Milcor, Karp or equal.

	Inryco/Milcor	Karp
Ceramic Tile	MS	214M-SS
Plaster	K	214PL
Drywall	DW	KDW
Acoustic Tile	M	DSC 214M-PC

- C. Access panel indicated or required for access to mechanical, electrical or other equipment shall match those specified above.
- D. Access panel in fire rated partitions and ceilings shall bear UL labels indicating the same rating as partition or ceiling.
- 2.03 FINISHES: Access panels in painted walls shall be furnished with factory-applied prime coat, unless otherwise indicated. Access panels in tile walls shall be stainless steel, unless otherwise indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install access panels in accordance with manufacturer's recommendations. Provide channel framing for panels, and securely attach panels to frames. Align panels so that finish surface of panels is in same plane as finish materials. Panels shall be plumb and level.
- B. At sound-rated construction, seal door flanges with Pamko S-88 smoke seal at perimeter. Seal entire assembly to gypsum board with acoustical sealant.
- C. Check access panels at completion of work for proper opening and closing, and, if damaged, repair or replace.

END OF SECTION 08 31 16

SECTION 08 41 13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Aluminum-Framed Entrances and Storefronts, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to: Aluminum Entrance and Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
  - 1. Heavy duty aluminum entrance system.
- C. Related Sections:
  - 1. Section 08 42 29 Sliding Automatic Aluminum Framed Entrances
  - 2. Section 08 71 00 Finish Hardware
  - 3. Section 08 81 00 Glazing

1.02 SYSTEM DESCRIPTION

- A. Storefront System Performance Requirements:
  - 1. Wind loads: Provide Storefront system; include anchorage, capable of withstanding wind load design pressures per California Building Code; 2016 Edition.
  - 2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft<sup>2</sup> (0.3 l/s • m<sup>2</sup>) at a static air pressure differential of 6.24 psf (300 Pa).
  - 3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
  - 4. Load: Design loads shall be per drawings. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
  - 5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
    - a. 0.46 (low-e) or 0.63 (clear).
  - 6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
    - a. Glass to Exterior – 60frame and 63glass (low-e) or 60frame and 58glass (clear).

1.03 SUBMITTALS

- A. General: Prepare, review, approve, and submit specified submittals in accordance with Section 01 33 00 Submittal Procedure.

B. Quality Assurance/Control Submittals:

1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

1.04 WARRANTY

A. Project Warranty: Refer to “Conditions of the Contract” for project warranty provisions.

B. Manufacturer's Product Warranty: Submit, for Owner's acceptance, manufacturer's warranty for storefront system as follows:

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by Kawneer.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
2. Manufacturer Qualifications: Manufacturer capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Kawneer Company, Inc.

1. <http://www.kawneer.com>

B. Alternate Manufacturer: Vistawall Group, a division of Oldcastle Glass

1. <http://www.vistawall.com>
2. <http://www.oldcastleglass.com>

C. Or equal as approved by the Architect.

## 2.02 ENTRANCES

### A. Exterior Entrances

1. Series: Tuffline 350.
2. Door Framing: 3-1/2" wide stiles with 2" deep door section of 3/16" walls.
3. Frame Face: 2" width and 4-1/2" depth.
4. Material: ASTM B 221; 6063-T6 alloy and temper.
5. Glazing: See drawings and glazing section.
6. Finish/Color: AA-A44, Architectural Class I Color Anodic Coating, Dark Bronze.
7. Fire Rating: As per door schedule

### B. Hardware

1. Aluminum Exterior and Interior Doors:
  - a. Hinging: Continuous gear hing.
  - b. Weatherstrip: Manufacturer's standard weatherstrip.
  - c. Door Bottom Sweep: Manufacturer's standard bottom sweep.
2. Wood Interior Doors: Per door hardware Section 08 71 00.

## 2.03 ACCESSORIES

- A. Fasteners: Where exposed, shall be Stainless Steel.
- B. Gaskets: Glazing gaskets shall be extruded EPDM rubber.
- C. Perimeter Anchors: Steel provided insulation between steel material and aluminum material is provided to prevent galvanic action.

## 2.04 RELATED MATERIALS

- A. Sealants: Refer to Joint Treatment (Sealants) Section.
- B. Glass: Refer to Glass and Glazing Section.

## 2.05 FABRICATION

- A. General:
  1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
  2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
  3. Prepare components to receive anchor devices. Fabricate anchors.
  4. Arrange fasteners and attachments to conceal from view.

## 2.06 FINISHES

A. Factory Finishing:

1. Kawneer Permanodic AA-M12C22A44, AAMA 611, Architectural Class I Color Anodic Coating.
2. Color: Dark Bronze.

2.07 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum storefront specified herein from a single source.

1. Building Enclosure System: When aluminum storefront is part of a building enclosure system, including entrances, entrance hardware, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.

B. Fabrication Tolerances: Fabricate aluminum storefront in accordance with framing manufacturer's prescribed tolerances.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive storefront system and sill plate is level in accordance with manufacturer's acceptable tolerances.

1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

3.02 INSTALLATION

A. General: Install storefront system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.

1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
2. Weathertight Construction: Install sill members and other members in a bed of sealant or with joint filler or gaskets, to provide weathertight construction. Coordinate installation with wall flashings and other components of construction.
3. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
4. Provide alignment attachments and shims to permanently fasten system to building structure.
5. Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

B. Related Products Installation Requirements:

1. Sealants (Perimeter): Refer to Joint Treatment (Sealants) Section.
2. Glass: Refer to Glass and Glazing Section.
  - a. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual.

3.03 PROTECTING AND CLEANING

- A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
- B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 08 41 13

SECTION 08 42 29.23 – SLIDING AUTOMATIC ALUMINUM FRAMED ENTRANCES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Automatic Entrances, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Furnish complete automatic aluminum door system, as specified, that has been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.
- C. Related Work:
  - 1. Masonry: Division 4, applicable sections.
  - 2. Electrical: Division 26, applicable sections.
  - 3. Storefront; Glass; Hardware: Division 8, applicable sections.
  - 4. Perimeter Sealants; Insulation: Division 7, applicable sections.

1.02 REFERENCES

- A. American Architectural Manufacturers Association (AAMA) 101: Appendix Dissimilar Materials.
- B. American Association of Automatic Door Manufacturers (AAADM).
- C. American National Standards Institute (ANSI):
  - 1. ANSI Z97.1: Safety Glazing Materials Used in Buildings - Methods of Test.
  - 2. ANSI A156.10: For Power Operated Pedestrian Doors; Sliding Doors section.
- D. American Society for Testing and Materials (ASTM) B221: Aluminum-Alloy Extruded Bars, Rods, Shapes and Tubes.
- E. National Fire Protection Association (NFPA) 101: Code for Safety to Life from Fire in Buildings & Structures.
- F. The Aluminum Association (AA) Aluminum Finishes Manual.
- G. Underwriters Laboratory, Inc. (USA & Canada) UI 325: Electrical Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's complete product and installation data.
- B. Shop Drawings: Submit drawings showing layout, profiles, product components including anchorage, accessories, finish and glazing details (where required).

C. Closeout Submittals:

1. Manufacturer's Operation and Maintenance Data.
2. Warranty document as specified herein.
3. AAADM inspection compliance form completed and signed by certified AAADM inspector prior to doors being placed in operation as proof of compliance with ANSI A156.10.

1.04 QUALITY ASSURANCE

- A. Installers Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
- B. Manufacturer's Qualifications: Manufacturer to have minimum (5) five years successful experience in the fabrication of automatic doors of the type required for this project. Manufacturer capable of providing field service representation during installation, approving acceptable installer and approving application method.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Ordering and Delivery: Comply with factory's ordering instructions and lead time requirements. Delivery shall be in factory's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Provide protection from exposure to harmful weather conditions and vandalism.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions/openings by field measurements before fabrication and record on shop drawings. Coordinate with fabrication and construction schedule to avoid construction delays.

1.07 WARRANTIES

- A. Manufacturer's Warranty: Units to be warranted against defect in material and workmanship for a period of one year from the Date of Substantial Completion. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under Contract Documents.
- B. Distributor's Warranty: One year warranty, labor and transportation charges for defective parts replacement.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Horton Automatics, a division of Overhead Door Corporation, shall manufacture automatic sliding door(s) of type(s) and size(s) specified on plans and door schedule.
- B. STANLEY Duraglide Model 2000 is an approved equal for this project



## 2.02 EQUIPMENT

- A. **Manufactured Door Units:** Shall include operator, header and track, jambs, sliding door panel(s), and sidelite(s). Units can be mounted within rough opening with sliding panel(s) sliding along sidelite. Units will be either single-slide or bipart and will be the following unit type:
1. Type 110: Slide-swing panel(s) shall slide along exterior side.
- B. **Operator:** The Electric Operating Mechanism shall be ProSlide™ Series 2003 Belt Drive. Maximum current draw shall not exceed 3.15 amps. The operator shall be mounted and concealed within the header.
1. Operating force shall be accomplished through a 1/8 HP DC permanent magnet motor with worm gear transmission and 1800 RPM working with drive belt, attached door hangers, and idler pulley. Drive belt to be steel reinforced nylon, 3/4" (19 mm) wide. Idler pulley to be reinforced, metallic material.
  2. Microprocessor Master Control shall have Version 2 software and have dual on-board seven-segment diagnostic display. The control shall have minimum of 28 programmable parameters including those functions required by ANSI A156.10. Control shall include separate day and night modes of operation with security over-ride. Adjustable Reversing Circuit will reopen door unit if closing path is obstructed. Maximum force required to prevent sliding panel from closing = 28 lbs.
  3. Finger Safety: When unit slides open, strike rail of sliding panel will stop short of adjacent sidelite; resulting opening is net slide.
  4. On/Off Switch shall be supplied. When switched OFF, unit reverts to free manual operation (likewise during electrical power failure).
- C. **SECURITY AND SAFETY POWER FAIL OPTIONS:**
1. **Automatic lock:** Automatically locks slide function of door when in closed position. Additional power supply for autolock not acceptable.
    - a. Autolock Fail Secure: If power fails the lock engages.
    - b. Autolock Fail Safe: If power fails the lock disengages.
  2. **Monitored Power Fail Options (battery back-up):**
    - a. Software Selectable Power Fail Open: If power fails the door slides open.
    - b. Software Selectable Power Fail Close: If power fails the door slides closed.
- D. **Proslide™ Header:** Shall be 6" (152 mm) deep by 6" (152 mm) high aluminum construction with removable face plate. Exception: Telescoping doors require 6" x 8" (203 mm) header.
1. Header to be flush to exterior of surrounding storefront aluminum frame with protrusion to the interior where necessary.
- E. **Header Track:** Shall be aluminum and replaceable. Rollers will be non-metallic, high quality ball bearing wheels 1-3/4" (44 mm) diameter. Anti-Derailing shall be accomplished by means of a separate adjustable roller.
- F. **Sliding Panel(S) And Sidelite(S):** Shall be aluminum, 1-3/4" (44 mm) deep with narrow stile construction. Weather-stripping to be along perimeter of sliding panel(s) and swing-out sidelite(s). Concealed guides to stabilize bottom of sliding panel.

1. Total weight limit per panel shall be:
    - a. 250 lbs. (113.4 kg) for slide panel (non-breakout).
    - b. 156 lbs. (70.7 kg) for UL listed slide-swing panel.
  2. Glazing prep to be for 1" (25 mm) glass.
  3. Sliding Panel and Sidelite Options shall be:
    - a. Recessed sidelite and track and non-threshold application.
    - b. Horizontal muntin(s) of size and type indicated.
- G. Emergency Egress: Slide-swing panels can swing out 90° from any position of slide movement and require no more than 50 lbf. (222 N) of force applied at the lock stile to open.
1. Slide-swing panels shall have torsion spring designed to re-close panel if pushed open in the direction of egress.
  2. Breakout mechanism shall provide support across full width of the door, in normal operating mode. In breakout mode, torsion assembly shall support weight of the door to minimize drop during emergency egress.
  3. Slide-swing panels shall include intermediate horizontal rail.
  4. Units with emergency egress feature are UL listed as an exit way and are compliant with NFPA 101.
- H. Jambs/Frame: Shall be aluminum. Jamb dimensions to be:
1. 1 3/4" (44 mm) deep by 4" (102 mm) wide.
  2. Frame Option: Transom: of size and type indicated, mounted on header
- I. Threshold: Shall be aluminum, 1/2" (25 mm) tall by 4" (102 mm) wide.
1. Threshold to be recessed and flush with adjacent finishes.
- J. Hardware: Provided and installed in strike rail shall be:
1. Hookbolt Lock latching into jamb or adjacent strike rail.
  2. Maximum Security Lock with 31/32" (25 mm) backset.
  3. Keyed Cylinder mounted on exterior side with 1 5/32" (29 mm) standard size cylinder. Provide Schlage Primus Cylinder, Everest Keyway. Key to college key system.
  4. Thumbturn mounted on interior side.
  5. Lockbolt into breakout carrier frame.
  6. Hardware Options:
    - a. Lockbolt into breakout carrier frame without hookbolt.
    - b. Lock Indicator.
    - c. Cylinder Guard.
    - d. Cylinder Escutcheon.
    - e. Flush Panic Exit Device: Recessed in muntin bar.

## 2.03 RELATED EQUIPMENT

- A. Basic Sensor System: Shall be 24 VDC, class II circuit and shall be adjusted and installed in compliance with ANSI A156.10. System shall include the following:

1. Activation sensors: Microwave or active infrared sensor shall be header-mounted each side of door unit for detection of traffic from each direction.
2. Threshold presence sensors:
  - a. Header mounted sensors shall provide active infrared presense detection on each side of the door unit and shall remain active throughout the entire door opening and closing cycle.
  - b. Hold-open beams: Two pulsed infrared photoelectric beams to be mounted in vertical rails of sidelite or in jambs. Sender/receiver arrangement parallels door opening.

#### 2.04 RELATED WORK REQUIREMENTS

- A. Electrical: 120 VAC, 60 cycle, single phase, dedicated 20 amp circuit per operator.
- B. Glass and Glazing: Glass stops, glazing vinyl and setting blocks for field glazing as per Safety Glazing standard ANSI Z97.1.2. Contractor to coordinate acquisition of glass in thickness and type in accordance with manufacturer's recommendations for prescribed design.

#### 2.05 MATERIALS, FINISHES AND FABRICATION

- A. Extruded Aluminum: ASTM B221, 6063-T5 alloy and temper, anodized:
  1. Structural Header Sections: Minimum 3/16" (5 mm) thickness.
  2. Structural Frame Sections: Minimum 1/8" (3 mm) thickness.
  3. Structural Panel Sections: Commercial grade.
- B. Finishes (for all exposed aluminum surfaces):
  1. Dark Bronze: Arch. Class I Anodized Coating, AA-MI2C22A2.
  2. Color to match aluminum-framed storefronts.
- C. Panel Construction:
  1. Corner block type with 3/16" steel backup plate construction, mechanically secured with minimum of four hardened steel screws. Sash consists of snap-in glass stops, snap-in glazing beads and vinyl gaskets.
  2. Weatherstripping material captured in extruded aluminum door panel. Door nosing weatherstrip to be spring-loaded adjustable astragal type. Surface applied self-adhesive weatherstripping not acceptable.
  3. Slide-swing doors to be supplied with adjustable glass setting block to allow for adjusting of door to meet site conditions eliminating the need for additional shims.
- D. Frame Construction: Butt joints mechanically secured by means of screws and formed aluminum corner brackets.
- E. Operator Construction: Electromechanical, modular type construction.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. SITE VERIFICATION OF CONDITIONS: Installer must verify that base conditions previously installed under other sections are acceptable for product installation according to manufacturer's

instructions. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of work. Do not start work until all negative conditions are corrected in a manner acceptable to the installer and manufacturer.

3.02 INSTALLATION

- A. General: Install door units plumb, level and true to line, without warp or rack of frames or sash with manufacturer's prescribed tolerances. Provide support and anchor in place.
- B. Dissimilar Materials: Comply with AAMA 101, Appendix Dissimilar Materials by separating aluminum materials and other corrodible surfaces from sources of corrosion or electrolytic action contact points.
- C. Weather-Tight Construction: Install header and framing members in a bed of sealant or with joint filler or gaskets. Coordinate installation with wall flashings and other components of construction.
- D. Electrical: Electrical contractor to install all wiring to operator on a separate circuit breaker routed into header.

3.03 CLEANING, ADJUSTMENT, AND PROTECTION

- A. Cleaning: After installation, installer to take following steps:
  - 1. Remove temporary coverings and protection of adjacent work areas.
  - 2. Remove construction debris from construction site and legally dispose of debris.
  - 3. Repair or replace damaged installed products.
  - 4. Clean product surfaces and lubricate operating equipment for optimum condition and safety.
- B. Adjustment: AAADM certified technician shall inspect and adjust installation to assure compliance with ANSI A156.10.
- C. ADVISE CONTRACTOR: Of precautions required through the remainder of the construction period, to ensure that doors will be without damage or deterioration (other than normal weathering) at the time of acceptance.

END OF SECTION 08 42 29.23

SECTION 08 62 00 TUBULAR DAYLIGHTING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tubular daylighting device, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.
- B. Accessories.

1.2 RELATED SECTIONS

- A. Section 07 54 19 - Fully-Adhered PVC Membrane Roofing.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.
- C. Section 26 05 00 - Common Work Results for Electrical.
- D. Section 26 50 00 - Lighting.

1.3 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.
- B. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.
- D. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.
- E. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.
- F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.
- G. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.
- H. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.
- I. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).
- J. UL 181 - Factory Made Air Ducts and Air Connectors
- K. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 2004.
- L. ICC-ES AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.4 PERFORMANCE REQUIREMENTS

- A. Completed tubular daylighting device assemblies shall be capable of meeting the following

performance requirements:

1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
2. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.
3. Uniform Load Test:
  - a. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).
  - b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
4. Fire Testing:
  - a. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.
  - b. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929.
  - c. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84) in way intended for use. Classification C.
  - d. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635.
  - e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D 635.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.
- D. Verification Samples: As requested by Architect.
- E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.
- F. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
  1. List of Daylight Credits available for the products specified.
  2. Data on Energy Optimization Performance Credits for the products specified.
  3. Data on Regional Credits which may be available for the project location.
  4. Data on Perimeter and Non-Perimeter Controllability of Systems for use of Daylight Dimmer option with the products specified.
  5. Data on potential Innovation in Design Credits which may be available for the innovative use of the products specified.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 15 years.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.9 WARRANTY

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.
- B. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Solatube International, Inc., which is located at: 2210 Oak Ridge Way ; Vista, CA 92081; Toll Free Tel: 888-765-2882; [www.solatube.com](http://www.solatube.com) Contact Sun West Distributors; 760-432-0729; [www.sunwestdistributors.com](http://www.sunwestdistributors.com)
- B. Substitutions: Not permitted.

#### 2.2 TUBULAR DAYLIGHTING DEVICES

- A. Tubular Daylighting Devices General : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.
- B. SolaMaster Series: Solatube Model 750 DS-O Open Ceiling, 21 inch (530 mm) Daylighting System:
  - 1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
    - a. Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibited, impact modified acrylic blend.
  - 2. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
  - 3. Metal Roof Flashing: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
    - a. Base Material: 1060 Aluminum Alloy, corrosion resistant conforming to ASTM B209, 0.059 inch (1.5 mm) thick.
  - 4. Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
  - 5. Tube Ring Seal: Attached to the base of the dome ring; butyl glazing rope 0.24 inch (6 mm) diameter; to minimize air infiltration
  - 6. Dome Seal: Adhesive backed weatherstrip, 0.63 inch (16 mm) tall by 0.28 inch (7 mm) wide.
  - 7. Reflective Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm).
    - a. General:
      - 1) Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm)

- less than 93 percent.
- 2) Color: a\* and b\* (defined by CIE L\*a\*b\* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
- b. Top Tube Angle Adapter, Type TA:
  - 1) Reflective 30 degree adjustable Top Tube Angle Adapter, 16 inches (406 mm) long.
- c. Extension Tube:
  - 1) Reflective extension tube, Type EXX, Notched for Open Ceiling diffuser attachment, 24 inches (610 mm) long
- 8. Diffuser Assemblies for Tubes Not Penetrating Ceilings (Open Ceiling): Solatube Model 750 DS-O. 21 inch (530 mm) diameter diffuser attached directly to bottom of tube.
  - a. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.
  - b. Diffuser Seal: Open cell foam, acrylic adhesive backed, 0.75 in (19 mm) wide by 0.125 in (3.2 mm) thick.
  - c. Diffuser Trim Ring: Injection molded acrylic. Nominal wall thickness 0.172 inches (4.4 mm)
- 9. Accessories:
  - a. Security Bar: Type B Security Bar 0.375 inch (95 mm) stainless steel bar across flashing diameter opening.
  - b. Open ceiling trim ring: Type R, Aluminum. Nominal thickness of 0.018 inch (0.5 mm).
  - c. Local Dimmer Control: Provided with dimmer switch and cable.
    - 1) Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, size 22 cable; providing daylight output between 2 and 100 percent. Provided with dimmer switch and cable.
    - 2) Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: only one switch is required per set of synchronously controlled dimmers.
    - 3) Cable: Type CA, Two conductor low voltage cable (500 ft.) for multiple unit DC connection.
- C. SolaMaster Series: Solatube Model 750 DS-C Penetrating Ceiling, 21 inch (530 mm) Daylighting System:
  - 1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
    - a. Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibited, impact modified acrylic blend.
  - 2. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
  - 3. Metal Roof Flashing: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
    - a. Base Material: 1060 Aluminum Alloy, corrosion resistant conforming to ASTM B209, 0.059 inch (1.5 mm) thick.
  - 4. Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
  - 5. Dome Seal: Adhesive backed weatherstrip 0.63 inch (16 mm) tall by 0.28 inch (7 mm).
  - 6. Reflective Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm).
    - a. General:
      - 1) Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm)



- less than 93 percent.
- 2) Color: a\* and b\* (defined by CIE L\*a\*b\* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
- b. Top Tube Angle Adapter and Bottom Top Tube Angle Adapter Kit, Type AK:
  - 1) Reflective 30 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long
- c. Extension Tube:
  - 1) Reflective extension tube, Type EXX, Notched for Open Ceiling diffuser attachment, 24 inches (610 mm) long
- 7. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 750 DS-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches (605 mm by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.
  - a. Round to square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch (2.8 mm) thick.
  - b. Natural Effect Lens made of acrylic, classified as CC2, Class C, 0.060 inch (1.5 mm) thick, with open cell foam seal to minimize condensation and bug, dirt, and air-infiltration per ASTM E283.
- 8. Accessories:
  - a. Security Bar: Type B Security Bar 0.375 inch (95 mm) stainless steel bar across flashing diameter opening.
  - b. Local Dimmer Control: Provided with dimmer switch and cable.
    - 1) Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, size 22 cable; providing daylight output between 2 and 100 percent. Provided with dimmer switch and cable.
    - 2) Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: only one switch is required per set of synchronously controlled dimmers.
    - 3) Cable: Type CA, Two conductor low voltage cable (500 ft.) for multiple unit DC connection.

### 2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Coordinate all roof penetrations, tube runs, and diffuser terminations and confirm that they are

compatible with the related architectural layouts prior to making roof penetrations. Contact the Architect immediately in the event of a discrepancy.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. Installer shall be factory trained and certified by the manufacturer prior to commencement of installation.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08 62 00

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Door Hardware, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide door hardware.

1.02 SUBMITTALS

- A. Submit hardware schedule organized by hardware set numbers in accordance with Division One, Section 01 33 00.
  - 1. Submit manufacturers' catalog cut sheets of all hardware items scheduled.
  - 2. Furnish templates to each fabricator of doors and frames as required for hardware preparation.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements
  - 3. Door Hardware:
    - a. Mounting height of latching hardware shall be 34" to 44" above finish floor per CBC Section 11B-404.2.7
    - b. Doors/doorways as part of an accessible route shall comply with CBC Sections 11B-404.
    - c. The clear opening width for a door shall be 32" minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into it below 34" and 4" maximum projections into it between 34" and 80" above the finish floor or ground. Door closers and stops shall be permitted to be 78" minimum above the finish floor or ground. CBC Section 11B-404.2.3
    - d. Handles, pulls, latches, locks, and operable parts on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, punching, or twisting of the wrist. Operable parts of such hardware shall be 34" minimum and 44" maximum above finish floor or ground. Where sliding doors are in the fully open position, operation hardware shall be exposed and usable from both sides.
    - e. The force for pushing or pulling open a door shall be as follows: CBC Section 11B-404.2.9.
      - i. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds maximum.
      - ii. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds.
      - iii. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
      - iv. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 pounds maximum to comply with CBC Section 11B-309.4

- f. Door closing speed shall be as follows: CBC Section 11B-404.2.8
  - i. Closer shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum
  - ii. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.
- g. Thresholds shall comply with CBC Section 1008.1.7 and 11B-404.2.5
- h. Floor stops shall not be located in the path and 4" maximum from walls. DSA policy 99-08.
- i. Hardware shall not be provided with "Night Latch" (NL) function for any accessible doors or gates unless the following conditions are met per DSA Interpretation 10-08 DSA / AC (External) revised 4/28/09. Such conditions must be clearly demonstrated and indicated in the specifications:
  - i. Such hardware has a dogging feature.
  - ii. It is dogged during the time the facility is open.
  - iii. Such "dogging" operation is performed only by employees as their job function ( non-public use ).
- j. Pair of doors: limit swing of one leaf to 90 degrees so that a clear floor space is provided beyond the arc of the swing for the wall-mounted tactile sign. CBC Section 11B-703.4.2.1.
- k. All Hardware shall meet the requirements of CBC Sections 11B-404.2.7, 11B-404.2.9 and 1010.1.9.

4. Exit Devices:

- a. Panic hardware shall comply with CBC Section 1010.1.10, ( consider that if the device is mounted lower than 36" AFF, the clear opening may be restricted to less than the 32" required clear opening ). Panic Bar shall be mounted above 36" to 44" above finished floor surface.
- b. The unlatching force shall not exceed 5 lbs applied in the direction of travel.
- c. Panic hardware shall not be provided with "Night Latch" (NL) function for any accessible doors or gates unless the following conditions are met per DSA Interpretation 10-08 DSA / AC (External) revised 4/28/09. Such conditions must be clearly demonstrated and indicated in the specifications:
  - i. Such hardware has a dogging feature.
  - ii. It is dogged during the time the facility is open.
  - iii. Such "dogging" operation is performed only by employees as their job function ( non-public use ).

B. Keying Schedule:

- 1. Submit (3) copies of detailed keying schedule with schematic layout to Contractor.
- 2. Keying schedule shall specify number of each door opening and associated key identification number stamped on each key. The number of each opening shall match the door and building number on the architectural floor plans.

C. Samples: If requested by the Architect, submit physical sample of each item of hardware proposed in work. Samples will be returned on the request of Contractor.

- D. It shall be the responsibility of the hardware supplier to examine the plans and specifications and furnish proper hardware for all openings. If there are any omissions in hardware groups, they shall be called to the attention of the Architect prior to bid opening and the omission will be corrected with an addendum. Hardware supplier shall be responsible to provide all hardware for a complete job.
- E. Doors and Frames: Hollow metal doors and frames shall be manufactured to templates. Provide backing / reinforcement as required for each hardware item. If required physical hardware items shall be furnished to related manufacturers.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Packaging: Each unit of hardware shall be individually packaged in the manufacturer's original containers.
- B. Wrapping: Wrap and cushion each item to prevent scratches and dents during delivery and storage.
- C. Markings: Each package shall be clearly marked on the outside, identifying the contents with specific opening number corresponding to those listed in the hardware schedule. Include door and item number for each product.

#### 1.05 WARRANTY

- A. All door hardware shall be supplied with a one year warranty against defects in materials and workmanship, commencing with substantial completion of job. Contractor shall provide adjustment to all finish hardware one year after completion of project. The one year adjustment shall be performed by a finish hardware manufacturer's representative.

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. All doors and gates with locking hardware shall be operable from the inside without the use of a key or any special knowledge or effort.
- B. All locks at all passage doors shall have lever type hardware or approved control devices for access compliance.
- C. All hardware exposed to the exterior shall be set with non-removable fastenings, sex bolts, special head screws or similar fastenings.
- D. Fire rated openings: Provide hardware for fire rated openings in compliance with the California Code of Regulations ( CCR ) Title 24, Part 2, California Building Code and NFPA Standard No. 80.
- E. Keying:
  - 1. Keying System: SCHLAGE PRIMUS HIGH SECURITY SYSTEM, EVEREST Keyway. No other keying system will be accepted. The PRIMUS system shall support a great grandmaster, grandmaster and master keying system.
  - 2. Contractor shall provide construction key cores for the course of construction. Contractor shall remove construction cores and install permanent cores when building is substantially complete.
  - 3. All keys shall be stamped "DO NOT DUPLICATE". All keys shall be stamped with identification number to match keying schedule.
  - 4. All cores shall be full size interchangeable with Schlage Logo.

5. All cylinders and keys shall be properly tagged to indicate their intended location and to enable the Owner, with a minimum of effort, to establish key control.
6. Provide complete bitting list of key cuts.
7. Supply keys in the following quantities:
  - a. Great Grand Master: four
  - b. GrandMaster: four
  - c. Master: four
  - d. Four keys per lock

F. Key Cabinet: Provide LUND 1204 KEY CABINET.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Hardware Supplier's Inspection: Before final inspection of the work under this contract and acceptance of the project, the hardware supplier shall inspect all items supplied under this section for conformance to the specifications, proper functioning, appearance, finish and installation. Check operation and adjustment of all hardware items. Hardware supplier shall notify in writing any deficiencies to the Architect and Contractor.

#### 3.02 INSTALLATION

- A. Installation of finish hardware is specified under other sections. However, the following requirements apply to the work as follows:
  1. Hardware shall be installed by a Qualified Mechanic skilled in the application of institutional grade builders hardware.
  2. Install all hardware in full compliance with manufacturer's instructions.
  3. When cutting and fitting is required to install hardware onto or into surfaces which are to be painted or finished, install each item completely and then remove during application of paint. After completion of painting application, reinstall each item.
  4. Install hardware after application of paint.
  5. Provide adequate backing in stud walls as required for proper attachment of each hardware item.
- B. Hardware Mounting Locations: As recommended by the Door and Hardware Institute, unless indicated otherwise. All lever hardware to be mounted between 34 inches and 44 inches.
- C. Thresholds: Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant. Remove excess sealant and clean adjacent surfaces. Cut and fit threshold to jamb with hairline joints.

#### 3.03 GENERAL

- A. Instruct Owner's personnel in proper maintenance and adjustment of each hardware item.
- B. Furnish to Owner all keys and extra keys organized neatly in key cabinet furnished for this project.
- C. Hardware Schedule: Provide hardware for each door as in the following list of hardware sets:

Quantity	Description	Model Number	Finish	Manufacturer
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**HARDWARE HEADING 1**

**Access Control**

Exterior Storefront Aluminum, Classroom, Panic Hardware

1	Touch Bar Exit Device	LD-PA-AX-99-EO	626	Von Duprin
1	Electronic Lock	AD-300-993R-50-MT-RHO-626-JD	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Hinging	As per storefront aluminum specifications		
1	Power Transfer	EPT-10	626	Von Duprin
1	Closer	4040, Parallel Arm	689	LCN
1	Wall type Holder	WS40	626	Ives
1	Door Silencer	As per storefront aluminum specifications		
1	Threshold	276 A (machine screws and anchors)	Alum.	Pemko
1	Weatherstrip	As per storefront aluminum specifications		
1	Door bottom sweep	315 CN ( neoprene seal )	Alum.	Pemko

AD300 ELECTRONIC LOCK LISTED AS REFERENCE FOR DOOR PREP ONLY, LOCK SHALL BE PROVIDED BY DIVISION 28

**HARDWARE HEADING 2**

**Access Control**

Exterior Hollow Metal Door and Frame, Mechanical Rooms

1	Electronic Lock	AD-300-MS-50-MT-RHO-626-JD	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Closer	4040, Parallel Arm	689	LCN
3	Butts	4 ½ x 4 ½ 5BB1HW	630	Ives
1	Power Transfer	EPT-10	626	Von Duprin
1	Wall type Holder	WS40	626	Ives
3	Door Silencer	1337-A	rubber	Quality
1	Threshold	276 A (machine screws and anchors)	Alum.	Pemko
1	Weatherstrip	2891 AS (silicone seal)	Alum.	Pemko
1	Door bottom sweep	315 CN ( neoprene seal )	Alum.	Pemko

AD300 ELECTRONIC LOCK LISTED AS REFERENCE FOR DOOR PREP ONLY, LOCK SHALL BE PROVIDED BY DIVISION 28

**HARDWARE HEADING 3**

**Access Control**

Exterior Hollow Metal Door and Frame, Gang Toilet Rooms

1	Electronic Lock	AD-300-MS-50-MT-RHO-626-JD	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Closer	4040, Parallel Arm	689	LCN
3	Butts	4 ½ x 4 ½ 5BB1HW	630	Ives
1	Power Transfer	EPT-10	626	Von Duprin
1	Wall type Holder	WS40	626	Ives
3	Door Silencer	1337-A	rubber	Quality
1	Threshold	276 A	Alum.	Pemko

		(machine screws and anchors)		
1	Weatherstrip	2891 AS (silicone seal)	Alum.	Pemko
1	Door bottom sweep	315 CN ( neoprene seal )	Alum.	Pemko

AD300 ELECTRONIC LOCK LISTED AS REFERENCE FOR DOOR PREP ONLY, LOCK SHALL BE PROVIDED BY DIVISION 28

**HARDWARE HEADING 4**

**Access Control**

Exterior Storefront Aluminum, Office

1	Electronic Lock	AD-300-MS-50-MT-RHO-626-JD	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Closer	4040, Parallel Arm	689	LCN
1	Hinging	As per storefront aluminum specifications		
1	Power Transfer	EPT-10	626	Von Duprin
1	Closer	4040, Parallel Arm	689	LCN
1	Wall type Holder	WS40	626	Ives
1	Door Silencer	As per storefront aluminum specifications		
1	Threshold	276 A	Alum.	Pemko
		(machine screws and anchors)		
1	Weatherstrip	As per storefront aluminum specifications		
1	Door bottom sweep	315 CN ( neoprene seal )	Alum.	Pemko

AD300 ELECTRONIC LOCK LISTED AS REFERENCE FOR DOOR PREP ONLY, LOCK SHALL BE PROVIDED BY DIVISION 28

**HARDWARE HEADING 5**

**Access Control**

Interior Hollow Metal Door and Frame, Data Room

1	Electronic Lock	AD-300-MS-50-MT-RHO-626-JD	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Closer	4040, Parallel Arm	689	LCN
3	Butts	4 ½ x 4 ½ 5BB1HW	630	Ives
1	Power Transfer	EPT-10	626	Von Duprin
1	Wall type Holder	WS40	626	Ives
3	Door Silencer	1337-A	rubber	Quality
1	Threshold	276 A	Alum.	Pemko
		(machine screws and anchors)		
1	Weatherstrip	2891 AS (silicone seal)	Alum.	Pemko
1	Door bottom sweep	315 CN ( neoprene seal )	Alum.	Pemko

AD300 ELECTRONIC LOCK LISTED AS REFERENCE FOR DOOR PREP ONLY, LOCK SHALL BE PROVIDED BY DIVISION 28

**HARDWARE HEADING 6**

**Access Control**

Interior Wood Door, Hollow Metal Frame, Office

1	Electronic Lock	AD-300-MS-50-MT-RHO-626-JD	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Closer	4040, Parallel Arm	689	LCN
3	Butts	4 ½ x 4 ½ 5BB1HW	630	Ives
1	Power Transfer	EPT-10	626	Von Duprin
1	Wall type Holder	WS40	626	Ives



3	Door Silencer	1337-A	rubber	Quality
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AD300 ELECTRONIC LOCK LISTED AS REFERENCE FOR DOOR PREP ONLY, LOCK SHALL BE PROVIDED BY DIVISION 28

**HARDWARE HEADING 7**

Interior Wood Door, Hollow Metal Frame, Exit Door with Panic Hardware

1	Touch Bar Exit Device	AX-CD-99NL-OP-PA	626	Von Duprin
1	Mortise Lock	L-Series, L9076-R-06A	626	Schlage
1	Permanent Core	20-740 XP	626	Schlage
1	Closer	4040, Parallel Arm	689	LCN
3	Butts	4 ½ x 4 ½ 5BB1HW	630	Ives
1	Power Transfer	EPT-10	626	Von Duprin
1	Wall type Holder	WS40	626	Ives
3	Door Silencer	1337-A	rubber	Quality

END OF SECTION 08 71 00

SECTION 08 81 00 GLAZING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Glazing, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide glazing at aluminum framed storefronts.
  - 2. Provide glazing at hollow metal framed door sidelites.
  - 3. Provide glazing in vision light doors.

1.02 REFERENCES

- A. All glazing shall meet the minimum requirements of the CBC, Chapter 24.
- B. All glazing in hazardous locations as per CBC, Section 2406.3 shall pass the test requirements of UBC Standard 24-2, Part I.
- C. Fire-Rated Assemblies shall comply with:
  - 1. ASTM E 119: Fire Tests of Building Construction and Materials.
  - 2. NFPA 80: Fire Doors and Windows.
  - 3. UL 263: Fire tests of Building Construction and Materials.
- D. Tempered / Heat-Treated Glass shall comply with ASTM C 1048; Type I; Quality q3.
- E. Laminated glass shall comply with ASTM C 1172.

1.03 SUBMITTALS

- A. Submit as per Section 01 33 00.
  - 1. Submit product data on glass type specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
  - 2. Setting blocks and glazing tape.
- B. Submit (3) 12"x12" samples of each type of material specified illustrating color, tint and design.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with FGMA Glazing Manuel and FGMA Sealant Manual.
- B. All tint shall be integral part of glazing, vinyl coated tint not allowed.

1.05 WARRANTY

- A. Provide ten year manufacturer's warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Insulated and Laminated Glazing

1. PPG Industries, Inc.
  - a. <http://www.ppg.com>

B. Fire-Rated Glazing

1. Windows/Sidelites/Transoms: Pilkington distributed by Technical Glass Products.
  - a. <http://www.pilkington.com>
  - b. <http://www.fireglass.com>
  - c. Acceptable Substitution: Vetrotech Saint-Gobain, <http://www.vetrotech.com>
2. Security Vision Lite Glazing: Vetrotech Saint-Gobain.
  - a. <http://www.vetrotech.com>

C. Security Vision Lite Frames

1. Air Louvers, Inc.
  - a. <http://www.airlouvers.com>

2.02 STANDARD GLAZING

A. Insulated Glass

1. Product: PPG Commercial One-Inch Insulating Glass Unit.
2. Construction: 1" total thickness: 1/4" tempered glass + 1/2" airspace + 1/4" tempered glass.
3. Low-e Coating: Solarban 70XL (on surface 3).
4. Tint: Bronze (on surface 2).
5. Locations: Exterior Doors and Windows, see door and window schedules.

B. Laminated Glass

1. Product: PPG Monolithic Laminated Glass.
2. Construction: 1/2" total thickness: 1/4" float glass + 0.060" clear PVB + 1/4" float glass.
3. Low-e Coating: None.
4. Tint: None (clear glass).
5. Locations: Interior Doors and Windows, see door and window schedules.

C. Security Vision Lites

1. Product
  - a. Frame: Air Louvers, Inc. model VLF-S10.
  - b. Glazing: PPG Monolithic Laminated Glass.
2. Construction: 1/2" total thickness: 1/4" float glass + 0.060" clear PVB + 1/4" float glass.

3. Low-e Coating: None.
4. Tint: None (clear glass).
5. Locations: Interior Doors, see door schedule.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation.
- C. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- D. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

#### 3.02 PROTECTING AND CLEANING

- A. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter.
  1. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- B. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 08 81 00

SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Non-Structural Metal Framing, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide metal stud framing at interior partition walls and furred walls.
  - 2. Provide metal stud framing at exterior furred walls.
  - 3. Provide metal ceiling joists and soffits.
  - 4. Provide framing accessories.

1.02 REFERENCES

- A. ASTM C 645 – 98 Standard Specification for Nonstructural Steel Framing Members.

1.03 SUBMITTALS

- A. Submit product data describing standard framing member materials and finish, product criteria, load charts, limitations and accessories.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: ICC Approved.
- B. Manufacturer: Company specializing in non-bearing metal studs with minimum 5 years experience.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stud Framing Materials:
  - 1. Studs: ASTM C 645, minimum yield 33 ksi, hot dip galvanized or electro galvanized sheet steel, C type, 18 gauge thick, minimum width as per drawings.
  - 2. Track: Formed Sheet Steel; channel shaped; same width as studs; tight fit; 18 gauge thick; solid web; long leg at ceilings
  - 3. Fasteners: ASTM C954 self drilling, self tapping screws, Type S-12 pan head, ½” long.
  - 4. Stiffeners: 3/4", .3 lbs per lin. ft., cold or hot rolled channel, 16 gauge.
  - 5. Anchorage Devices: As per contract documents.
- B. Ceiling Framing Materials:
  - 1. Joist: ASTM C 645, minimum yield 33 ksi, hot dip galvanized or electro galvanized sheet steel, C type, 18 gage thick, minimum width per drawings.
  - 2. Track: Formed Sheet Steel; oversized channel; same width as studs; tight fit; 18 gage thick.
  - 3. Fasteners: ASTM C954 self drilling, self tapping screws, Type S-12 pan head, ½” long.

4. Mid Span Support: As per contract documents.
5. Anchorage Devices: As per contract documents.

C. Minimum Section Properties:

DESIGNATION	SIZE	FLANGE	GAUGE	THICKNESS	AREA	I <sub>x</sub>	S <sub>x</sub>
250S162-43	2 ½"	1 5/8"	18 GA.	0.0451 in	0.289 in <sup>2</sup>	0.302 in <sup>4</sup> /ft	0.242 in <sup>3</sup> /ft
362S162-33	3 5/8"	1 5/8"	20 GA.	0.0346 in	0.262 in <sup>2</sup>	0.551 in <sup>4</sup> /ft	0.304 in <sup>3</sup> /ft
362S162-43	3 5/8"	1 5/8"	18 GA.	0.0451 in	0.340 in <sup>2</sup>	0.710 in <sup>4</sup> /ft	0.392 in <sup>3</sup> /ft
400S162-43	4"	1 5/8"	18 GA.	0.0451 in	0.357 in <sup>2</sup>	0.892 in <sup>4</sup> /ft	0.446 in <sup>3</sup> /ft
600S162-43	6"	1 5/8"	18 GA.	0.0451 in	0.447 in <sup>2</sup>	2.316 in <sup>4</sup> /ft	0.772 in <sup>3</sup> /ft
600S162-54	6"	1 5/8"	26 GA.	0.0566 in	0.556 in <sup>2</sup>	2.860 in <sup>4</sup> /ft	0.953 in <sup>3</sup> /ft
800S162-43	8"	1 5/8"	18 GA.	0.0451 in	0.537 in <sup>2</sup>	4.633 in <sup>4</sup> /ft	1.158 in <sup>3</sup> /ft
800S162-54	8"	1 5/8"	16 GA.	0.0566 in	0.670 in <sup>2</sup>	5.736 in <sup>4</sup> /ft	1.434 in <sup>3</sup> /ft
800S162-68	8"	1 5/8"	14 GA.	0.0713 in	0.836 in <sup>2</sup>	7.089 in <sup>4</sup> /ft	1.772 in <sup>3</sup> /ft
800S250-68	8"	2 ½"	14 GA.	0.0713 in	0.978 in <sup>2</sup>	9.261 in <sup>4</sup> /ft	2.315 in <sup>3</sup> /ft
800S250-97	8"	2 ½"	12 GA.	0.1017 in	1.372 in <sup>2</sup>	12.789 in <sup>4</sup> /ft	3.053 in <sup>3</sup> /ft

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with ASTM C754.
- B. Install prefabricated slip track at top of wall. Attach to supporting structure above.
- C. Align and fasten top and bottom runners at maximum 32" O.C.
- D. Construct corners and intersections as per contract documents.
- E. Stud splicing not permissible.
- F. Provide all backing as required.
- G. Wall Tolerances:
  1. Maximum Variation from true position: 1/8"
  2. Maximum variation of any member from plane: 1/8"
  3. Maximum variation between parallel walls: 1/8"

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Gypsum Board Assemblies, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Gypsum Board at ceilings.
  - 2. Gypsum Board at walls.
  - 3. Taped and sanded joint treatment.
  - 4. Texture

1.02 SUBMITTALS

- A. Submit product data for gypsum board, joint tape and fasteners as per Section 01 33 00.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Gypsum Wallboard: ASTM C 36, United States Gypsum Company, Sheetrock brand Gypsum Panels, 5/8" Type X, tapered edge.
- B. Gypsum Wallboard Joint Treatment Materials: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
  - 1. Joint Tape: Sheetrock Joint Tape, cross fibered paper.
  - 2. Joint Compound: United States Gypsum Company, Sheetrock All Purpose Joint Compound Ready Mixed.
- C. Gypsum Board Accessories:
  - 1. Corner Bead: United States Gypsum Company, Sheetrock Brand Paper Faced Metal 3/4" Bullnose.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Commencement of work constitutes acceptance of substrate. All framing members shall be true and straight. Any framing or furring member that varies more than 1/8" from the plane of adjacent framing or furring members shall be corrected under the rough carpentry section before gypsum wallboard is installed. Inspect all substrate and report all conditions which will jeopardize smooth satisfactory finish.

- B. Tolerances: Maximum variation from true flatness shall be 1/8" in 10 feet in any direction.

### 3.02 INSTALLATION

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840, GA-216 and Section 2508 of The California Building Code.
- B. Installing Gypsum Board Trim Accessories: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
  - 1. Install cornerbead at external corners.
  - 2. Install edge trim where edge of gypsum panels would otherwise be exposed.
- C. Finishing Gypsum Board Assemblies: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
  - 1. Prefill open joints and damaged areas using All Purpose Joint Compound.
  - 2. Apply joint tape over gypsum board joints, including over trim accessories with flanges. Embed joint tape in joint compound.
  - 3. Apply two coats of joint compound or finishing compound over all joints and dimples from fasteners. Sand between coats as required.
- D. Apply Gypsum Board Texture Finishes as follows:
  - 1. Provide texture as per finish schedule.
- E. Ceilings: Provide minimum 5/8" gypsum board at ceilings.
- F. Walls: Provide minimum 5/8" gypsum board full height of all walls, to bottom chord of truss, unless noted otherwise.

END OF SECTION 09 29 00



SECTION 09 30 13 CERAMIC TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Ceramic Tile, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Provide ceramic tile at toilet rooms.
  - 2. Match existing tile to remain
  - 3. Provide metal lath and mortar bed.

1.02 REFERENCES

- A. Handbook for Ceramic Tile Installation

1.03 SUBMITTALS

- A. In addition to Product Data for each type of tile and setting material indicated, submit the following:
  - 1. Samples of each type and composition of tile and for each color and texture required.
  - 2. Product data indicating manufacturer's specifications instructions for using mortar and grout.

1.04 STATIC COEFFICIENT OF FRICTION

- A. Tile shall be non-slip, with static coefficient of friction, wet or dry as per ASTM C 1028:
  - 1. Level Surfaces: Minimum 0.6.
  - 2. Step Treads: Minimum 0.6.
  - 3. Ceramic Tile Flooring shall be stable, firm and slip resistant, CBC Section 11B-302.1.

1.05 ADDITIONAL MATERIAL

- A. Contractor shall provide 3 % additional tile and trim pieces of each type, color and size used for this project. Deliver to Owner in securely packaged and labeled boxes.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Tile Products Manufacturers: Dal-Tile Corporation, or Equal.
- B. Tile-Setting and Grouting Materials Manufacturers:
  - 1. Laticrete International, Inc.
  - 2. Custom Building Products

- C. ANSI Ceramic Tile Standard: Ceramic tile flooring shall be stable, firm and slip resistant per CBC Section 11B-302.1. Provide tile that complies with Standard Grade requirements of ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.
- E. INTERIOR FLOOR TILE
  - 1. Field Tile: DAL TILE Colorbody Porcelain, Valais
    - a. Match existing
    - b. Composition: Porcelain
    - c. Module Size: 2" x 2"
    - d. Nominal Thickness: 1/4"
    - e. Color: match existing
- F. INTERIOR WALL TILE
  - 1. Wall Tile: DAL TILE Semi-Gloss
    - a. Match existing
    - b. Module Size: 4-14" x 4-1/4"
    - c. Nominal Thickness: 5/16"
    - d. Edge: cushioned edge
    - e. Color: match existing
  - 2. Wall Tile: DAL TILE Colorbody Porcelain, Valais
    - a. Composition: Porcelain
    - b. Module Size: 12" x 12"
    - c. Nominal Thickness: 3/8"
    - d. Color: Carmelo VL81
- G. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
  - 1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
  - 2. Provide radius at all inside corners, provide bullnose at all outside corners, provide cove base at all wall tile that abuts floor tile.
- H. Accessories: Provide materials complying with ANSI A108.1A and as specified below:
  - 1. Waterproofing / Anti-fracture Membrane for Thin-Set Tile Installations: Provide products that comply with ANSI A118.10.
    - a. Waterproofing / Anti-fracture Membrane: LATICRETE 9235. Membrane to be thin, cold applied, single component liquid, load bearing and non-toxic.
  - 2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82, except for minimum wire size.
  - 3. Expanded Metal Lath: Provide diamond-mesh lath complying with ASTM C 847 for requirements indicated below:

- a. Configuration over Studs and Furring: Flat.
- b. Configuration over Solid Surfaces: Self-furring.
- c. Weight: 3.4 lb/sq. yd.

I. Setting Bed Materials:

1. Portland Cement: ASTM C150, Type 1
2. Lime: ASTM C 207, Type S
3. Sand: ASTM C 144
4. Water: Potable
5. Paper Backing for Walls: Asphalt-impregnated paper complying with Federal Standard UU-B-790a, Type I, Grade D (vapor permeable), Style 2, Jumbo Tex, manufactured by Fortifiber Corporation.

J. Setting Bed:

1. Setting Bed Mix for Floors: One part Portland Cement, 6 parts damp sand, up to 1/10 part hydrated lime by volume.
2. Scratch and Leveling Coat for Walls: 1 part Portland Cement, 5 parts damp sand, ½ part hydrated lime.
3. Admixture: Mix in accordance with manufacturer's directions.

K. Thin Bed Setting Material: Provide materials complying with ANSI A118.4.

1. LatiCrete 254 Platinum

L. Grouting and Sealing Materials, as follows:

1. Walls
  - a. LATICRETE LATAPOXY 2000 Industrial Grout
  - b. LATICRETE Latasil 9118 Primer
2. Floors
  - a. Laticrete LATAPOXY 2000 Industrial Grout
  - b. LATICRETE Latasil 9118 Primer

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.
1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
  2. Remove protrusions, bumps, and ridges by sanding or grinding.

- B. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.
- C. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated.
- D. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated.
  - 1. Interior wall tile: W241-03
  - 2. Interior Floor tile at toilet rooms: F111-03
  - 3. Interior Floor tile:F113-03
- E. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- F. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- G. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- H. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
  - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
  - 2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."
- I. Mixing:
  - 1. Mix Latex Portland Cement Mortar in accordance with manufacturer's instructions.
  - 2. The proper mortar consistency is such that when applied with the recommended notched trowel to the backing, the ridges formed in the mortar will not flow or slump.
- J. Installation of Setting Beds at Floors:
  - 1. Install setting bed in accordance with TCA Handbook for Ceramic Tile Installation.
  - 2. Place wire reinforcing and setting bed over the cleavage membrane. Lap reinforcing at least one full mesh and support so that reinforcing is approximately in the middle of the setting bed.
  - 3. Firmly tap setting bed to levels required.
- K. Installation of Setting Beds at Walls: Install metal lath and scratch coat to walls to comply with ANSI A108.1A, Section 4.1.
  - 1. Install paper and metal lath in accordance with TCA Handbook for Ceramic Tile Installation.

2. Install scratch and leveling coat in accordance with TCA Handbook for Ceramic Tile Installation.
  3. Apply setting bed over surfaces to a minimum thickness of 7/8 inch, 3/4 inch over solid substrate.
  4. Allow setting bed to cure in accordance with ANSI A108.1
- L. Mortar Application:
1. Clean surface thoroughly. Dampen if dry, but do not saturate.
  2. Apply mortar with flat side of trowel, comb mortar using a notched trowel to obtain even setting bed. Tile shall not be applied to skinned over mortar.
- M. Floor Tile Installation: Install tile to comply with requirements indicated, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.
1. Joint Widths: Install tile on floors with the following joint widths:
    - a. Porcelain Tile: 1/4"
  2. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards.
  3. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
  4. Sound tile after setting. Replace hollow sounding units.
  5. Provide water proofing / anti-fracture membrane on all floors
- N. Wall Tile Installation: Install types of tile designated for wall installations to comply with requirements indicated, including those referencing TCA installation methods and ANSI setting-bed standards.
1. Joint Widths: Install tile on walls with the following joint widths:
    - a. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
    - b. Wall Tile: 1/16 inch (1.6 mm).
  2. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards.
- O. Installation of Grout:
1. Remove all mortar from face and edges of tile.
  2. Force a maximum amount of grout into the joints. Cushioned edge tile shall be finished evenly to the depth of the cushion. Square edge tile shall be finished flush with the tile surface. Finished joint shall be uniform in color, smooth and without pinholes, voids or low spots.
  3. Grout tile to comply with the requirements of the following tile installation standards:
    - a. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
    - b. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
    - c. For chemical-resistant furan grouts, comply with ANSI A108.8.
- P. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Use cleaning materials and methods that comply with tile and grout manufacturers' written instructions.

1. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

END OF SECTION 09 30 13

SECTION 09 30 33 NATURAL STONE TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Ceramic Tile, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Provide interior and exterior natural stone tile.
  - 2. Provide interior and exterior metal lath and mortar bed.

1.02 REFERENCES

- A. Handbook for Ceramic Tile Installation

1.03 SUBMITTALS

- A. In addition to Product Data for each type of tile and setting material indicated, submit the following:
  - 1. Samples of each type and composition of tile and for each color and texture required.
  - 2. Product data indicating manufacturer's specifications instructions for using mortar and grout.

1.04 STATIC COEFFICIENT OF FRICTION

- A. Tile shall be non-slip, with static coefficient of friction, wet or dry as per ASTM C 1028:
  - 1. Level Surfaces: Minimum 0.6.
  - 2. Step Treads: Minimum 0.6.
  - 3. Stone Tile Flooring shall be stable, firm and slip resistant. CBC 11B-302.1.

1.05 ADDITIONAL MATERIAL

- A. Contractor shall provide 3 % additional tile and trim pieces of each type, color and size used for this project. Deliver to Owner in securely packaged and labeled boxes.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Tile Products Manufacturers: Dal-Tile Corporation, or Equal.
- B. Tile-Setting and Grouting Materials Manufacturers:
  - 1. Laticrete International, Inc.
  - 2. Custom Building Products

- C. ANSI Ceramic Tile Standard: Provide tile that complies with Standard Grade requirements of ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.
- E. INTERIOR FLOOR NATURAL STONE TILE
  - 1. Field Tile: DAL TILE Limestone Collection
    - a. Composition: Limestone
    - b. Module Size: 18" x 18"
    - c. Nominal Thickness: 3/8"
    - d. Color: Jurastone Beige L711, Honed
- F. INTERIOR WALL NATURAL STONE TILE
  - 2. Wall Tile: DAL TILE Limestone Collection
    - a. Composition: Limestone
    - b. Module Size: 16" x 16"
    - c. Nominal Thickness: 3/8"
    - d. Color: Jurastone Beige L711, Honed
  - 3. Wall Base: DAL TILE Limestone Collection
    - a. Composition: Limestone
    - b. Module Size: 18" x 18" and 12" x 12"
    - c. Nominal Thickness: 3/8"
    - d. Color: Jurastone Beige L711, Honed
- G. EXTERIOR WALL NATURAL STONE TILE
  - 1. Field Tile: DAL TILE Travertine Collection
    - a. Composition: Travertine
    - b. Module Size: 16" x 16"
    - c. Nominal Thickness: 3/8"
    - d. Color: Bander Red T310, sealed
- H. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
  - 1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
  - 2. Provide radius at all inside corners, provide bullnose at all outside corners, provide cove base at all wall tile that abuts floor tile.
- I. Accessories: Provide materials complying with ANSI A108.1A and as specified below:
  - 1. Waterproofing / Anti-fracture Membrane for Thin-Set Tile Installations: Provide products that comply with ANSI A118.10.



- a. Waterproofing / Anti-fracture Membrane: LATICRETE 9235. Membrane to be thin, cold applied, single component liquid, load bearing and non-toxic.
  2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82, except for minimum wire size.
  3. Expanded Metal Lath: Provide diamond-mesh lath complying with ASTM C 847 for requirements indicated below:
    - a. Configuration over Studs and Furring: Flat.
    - b. Configuration over Solid Surfaces: Self-furring.
    - c. Weight: 3.4 lb/sq. yd.
- J. Setting Bed Materials:
1. Portland Cement: ASTM C150, Type 1
  2. Lime: ASTM C 207, Type S
  3. Sand: ASTM C 144
  4. Water: Potable
  5. Paper Backing for walls: Asphalt-impregnated paper complying with Federal Standard UU-B-790a, Type I, Grade D (vapor permeable), Style 2, Jumbo Tex, manufactured by Fortifiber Corporation.
- K. Setting Bed:
1. Setting Bed Mix for Floors: One part Portland Cement, 6 parts damp sand, up to 1/10 part hydrated lime by volume.
  2. Scratch and Leveling Coat for Walls: 1 part Portland Cement, 5 parts damp sand, ½ part hydrated lime.
  3. Admixture: Mix in accordance with manufacturer's directions.
- L. Thin Bed Setting Material: Provide materials complying with ANSI A118.4.
1. LatiCrete 254 Platinum
- M. Grouting and Sealing Materials, as follows:
1. Walls
    - a. LATICRETE LATAPOXY 2000 Industrial Grout
    - b. LATICRETE Latasil 9118 Primer
  2. Floors
    - a. Laticrete LATAPOXY 2000 Industrial Grout
    - b. LATICRETE Latasil 9118 Primer

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.

1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
  2. Remove protrusions, bumps, and ridges by sanding or grinding.
- B. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.
- C. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated.
- D. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated.
1. Interior wall tile: W241-03
  2. Interior Floor tile: F113-03
  3. Exterior wall tile: W241-03
- E. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- F. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- G. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- H. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Locate joints in tile surfaces directly above joints in concrete substrates.
  2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."
- I. Mixing:
1. Mix Latex Portland Cement Mortar in accordance with manufacturer's instructions.
  2. The proper mortar consistency is such that when applied with the recommended notched trowel to the backing, the ridges formed in the mortar will not flow or slump.
- J. Installation of Setting Beds at Walls: Install metal lath and scratch coat to walls to comply with ANSI A108.1A, Section 4.1.
1. Install paper and metal lath in accordance with TCA Handbook for Ceramic Tile Installation.
  2. Install scratch and leveling coat in accordance with TCA Handbook for Ceramic Tile Installation.
  3. Apply setting bed over surfaces to a minimum thickness of 7/8 inch, 3/4 inch over solid substrate.
  4. Allow setting bed to cure in accordance with ANSI A108.1

- K. Mortar Application:
1. Clean surface thoroughly. Dampen if dry, but do not saturate.
  2. Apply mortar with flat side of trowel, comb mortar using a notched trowel to obtain even setting bed. Tile shall not be applied to skinned over mortar.
- L. Floor Tile Installation: Install tile to comply with requirements indicated, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.
1. Joint Widths: Install tile on floors with the following joint widths:
    - a. Natural Stone Tile: ¼"
  2. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards.
  3. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
  4. Sound tile after setting. Replace hollow sounding units.
  5. Provide liquid applied anti-fracture membrane over entire concrete floor.
- M. Wall Tile Installation: Install types of tile designated for wall installations to comply with requirements indicated, including those referencing TCA installation methods and ANSI setting-bed standards.
1. Joint Widths: Install tile on walls with the following joint widths:
    - a. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
    - b. Wall Tile: 1/16 inch (1.6 mm).
  2. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards.
- N. Installation of Grout:
1. Remove all mortar from face and edges of tile.
  2. Force a maximum amount of grout into the joints. Cushioned edge tile shall be finished evenly to the depth of the cushion. Square edge tile shall be finished flush with the tile surface. Finished joint shall be uniform in color, smooth and without pinholes, voids or low spots.
  3. Grout tile to comply with the requirements of the following tile installation standards:
    - a. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
    - b. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
    - c. For chemical-resistant furan grouts, comply with ANSI A108.8.
- O. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Use cleaning materials and methods that comply with tile and grout manufacturers' written instructions.
1. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

END OF SECTION 09 30 13

SECTION 09 51 13 ACOUSTICAL PANEL CEILINGS – LAY-IN

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Acoustical Panel Ceilings as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide Acoustic Panels for Standard Ceilings.
- C. Related Sections:
  - 1. Section 09 53 23 – Metal Acoustical Ceiling Suspension Assemblies.
  - 2. Section 11 52 19 – Projectors and Monitors.
  - 3. Section 23 00 00 – HVAC.
  - 4. Section 26 50 00 – Lighting.

1.02 SUBMITTALS

- A. Product Data.
- B. Samples: Submit three samples of each panel type.

1.03 ADDITIONAL MATERIALS

- A. Provide ten cartons of each of each type of material specified.

1.04 QUALITY ASSURANCE

- A. Interior wet work shall be completed prior to installation of panels. Windows and doors shall be in place. HVAC system shall be installed and operable to maintain a temperature range of 60 to 90 degrees F and maximum 70 percent relative humidity.
- B. Fire Classification Requirements: ASTM E84; All materials shall have flame spread of less than 25 and a smoke density rating of less than 450.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. USG Corporation
- B. Or approved equal

2.02 STANDARD CEILING Type 1

- C. Acoustical Panel: USG "F" Fissured
1. Location: all suspended ceilings
  2. Size: 24" x 24".
  3. Thickness: 3/4".
  4. Light Reflectance: 0.70.
  5. Weight: 1.45 lbs/SF.
  6. Edge Detail: SL, Angled Tegular.
  7. Material: Cast mineral fiber.
  8. Color: White.
  9. Acoustics: NRC 0.70, CAC Min. 35

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install panels when all work above grid is complete.
- B. Install panels in place free from damaged edges or other defects detrimental to appearance and function.
- C. Replace all soiled panels.

END OF SECTION 09 51 13

SECTION 09 53 23 METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Metal Acoustical Ceiling Suspension Assemblies as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Provide suspension system for Standard Ceilings.
  - 2. Provide suspension system for Floating Ceilings with Knife Edge Trim.
  - 3. Provide suspension system for Wood Tile Ceilings.
  - 4. Provide suspension system for Floating Wood Canopies.
  - 5. Provide hanger wires for ceiling mounted HVAC and electrical items as per details.
- C. Related Sections:
  - 1. Section 09 22 16 – Non Structural Metal Framing: Refer to details on drawings.
  - 2. Section 09 51 13 – Acoustical Ceiling Panels – Lay-In.
  - 3. Section 23 00 00 – HVAC: Coordination of hanger wires.
  - 4. Section 26 50 00 – Lighting: Coordination of hanger wires.

1.02 SUBMITTALS

- A. Product Data.
- B. Samples: Submit three sets of 12-inch long samples of suspension system main runner, cross runner and edge trim of each grid type.

1.03 QUALITY ASSURANCE

- A. Manufacturers must have an active DSA Product acceptance approval on file.
- B. Fire Classification Requirements: ASTM E84; All materials shall have flame spread of less than 25 and a smoke density rating of less than 450.
- C. Tee Systems: All systems to be heavy duty per ASTM C635.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Armstrong World Industries, Inc.
  - 1. <http://www.armstrong.com>.
- B. Or approved equal by:
  - 1. USG Corporation

a. <http://www.usg.com>

2. Chicago Metallic Corporation

a. <http://www.chicago-metallic.com>

## 2.02 STANDARD CEILING

A. Tee System: Armstrong Prelude XL.

1. Grid: Heavy Duty 15/16 inch wide face exposed T.

- a. Main Runners: Armstrong 7301.
- b. 4' Cross Tees: Armstrong XL7341.
- c. 2' Cross Tees: Armstrong XL7328.
- d. Wall Angle: Armstrong 7800.

2. Grid Color: Silver Satin.

- a. Dark Bronze at Second Floor Office Space.
- b. Tech Black above Floating Wood Canopies.

3. Grid Material: Commercial quality cold rolled steel, hot dipped galvanized.

4. Hanger Wire: 12 gauge galvanized, annealed steel wire.

5. Accessories: Stabilizer bars, splices, edge trim and all necessary components required for the specified suspended grid system.

## 2.03 FLOATING CEILING WITH KNIFE EDGE TRIM

A. Tee System: Armstrong Prelude XL.

1. Grid: Heavy Duty 15/16 inch wide face exposed T.

- a. Main Runners: Armstrong 7301.
- b. 4' Cross Tees: Armstrong XL7341.
- c. 2' Cross Tees: Armstrong XL7328.
- d. Wall Angle: Armstrong 7800 (where occurs).

2. Grid Color: Silver Satin.

3. Grid Material: Commercial quality cold rolled steel, hot dipped galvanized.

4. Hanger Wire: 12 gauge galvanized, annealed steel wire.

5. Cantilever Braces: Provide stainless steel cable bracing as per details.

6. Accessories: Stabilizer bars, splices, edge trim and all necessary components required for the specified suspended grid system.

B. Knife Edge Trim: Armstrong Axiom Knife Edge Perimeter Trim.

1. Size: 6" x 2-1/2".

2. Material: Extruded aluminum, alloy 6063.

3. Trim Color: To match grid color.

4. Installation Type: For Tegular panels.

5. Corners: Provide factory welded pieces for all corners.

## 2.04 FLOATING WOOD TILE CEILING



- A. Tee System: Armstrong Prelude XL.
  - 1. Grid: Heavy Duty 15/16 inch wide face exposed T.
    - e. Main Runners: Armstrong 7301.
    - f. 4' Cross Tees: Armstrong XL7341.
    - g. Wall Angle: Armstrong 7804 (where occurs).
  - 2. Grid Color: Tech Black.
  - 3. Grid Material: Commercial quality cold rolled steel, hot dipped galvanized.
  - 4. Hanger Wire: 9 gauge galvanized, soft-annealed steel wire.
  - 5. Cantilever Braces: Provide stainless steel cable bracing as per details.
  - 6. Accessories: Stabilizer bars, splices, edge trim and all necessary components required for the specified suspended grid system.
- B. Wood Trim: Armstrong Woodworks Perimeter Trim.
  - 1. Size: 4 inch height.
  - 2. Material: Fire-retardant particle board with face-cut veneer.
  - 3. Wood Veneer: To match wood ceiling tiles.
  - 4. Installation Type: For Vector panels.
  - 5. Corners: Miter all joints.

## 2.05 FLOATING WOOD CANOPIES

- A. Canopy System: Armstrong Woodworks Custom Canopies.
  - 1. Canopy Size: As per drawings.
  - 2. Grid: Armstrong Curved Grid Backbracing.
  - 3. Suspension System: As detailed on drawings.
- B. Wood Panels: Armstrong Woodworks Curved Canopy.
  - 1. Panel Size: 4 foot x 4 foot.
  - 2. Panel Arc: 27 foot radius.
  - 3. Material: Fire-retardant particle board with face-cut veneer.
  - 4. Wood Veneer: Maple (to match wood tile ceiling).
- C. Wood Trim: Armstrong Woodworks Canopy Upturns.
  - 1. Material: Fire-retardant particle board with face-cut veneer.
  - 2. Wood Veneer: To match canopy panels.
  - 3. Installation Type: Typical upturn type 1 (trim sits on top of panel).

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install system in accordance with ASTM C636, ASTM E580, Section 2-4701(e) Title 24, California Code of Regulations and DSA IR 25-2.13, and as supplemented in this section.

- B. The following notes are for ceiling systems whose total weight, including air conditioning/heating grills and light fixtures, does not exceed two (2) psf. See plans for special details of heavier systems, and those supporting lateral loads from partitions. Also, see DSA IR 25-3.13 for heavier systems.
1. #12 gage (min.) hanger wires may be used for up to and including 4 ft. by 4 ft. grid spacing and shall be attached to main runners.
  2. Provide #12 gage hanger wires at the ends of all main and cross runners within eight (8) inches of the support or within one-fourth (1/4) of the length of the end tee, whichever is least, for the perimeter of the ceiling area. End connections for runners which are designed and detailed to resist the applied vertical and horizontal forces may be used in lieu of the #12 gage hanger wires, subject to Division of the State Architect (DSA) review and approval.
  3. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires.
  4. Ceiling grid members may be attached to not more than two (2) adjacent walls. Ceiling grid members shall be at least 3/4 inch clear of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free, and a minimum of 3/4 inch clear of wall.
  5. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or a #16 gage wire with a positive mechanical connection to the runner may be used. Where the perpendicular distance from the wall to the first parallel runner is 8 inches or less, this interlock is not required.
  6. Provide bracing assemblies consisting of a compression strut and four (4) #12 gage splayed bracing wires oriented 90 degrees from each other at the following spacing:
    - a. For school buildings, place bracing assemblies at a spacing not more than 12 ft. by 12 ft. on center.
    - b. For essential services buildings, place bracing assemblies not more than 8 ft. by 12 ft. on center.
    - c. Provide bracing assemblies at locations not more than one half (1/2) the spacings given above, from each perimeter wall and at the edge of vertical ceiling offsets. The slope of these wires shall not exceed 45 degrees from the plane of the ceiling and shall be taut. Splices in bracing wires are not to be permitted without special DSA approval.
    - d. Suspended acoustical ceiling systems with a ceiling area of 144 square feet or less, and fire rated suspended acoustical ceiling systems with a ceiling area of 96 square feet or less, surrounded by walls which connect directly to the structure above, do not require bracing assemblies when attached to two adjacent walls.
  7. Fasten hanger wires with not less than three (3) tight turns. Fasten bracing wires with four (4) tight turns. Make all tight turns within a distance of 1-1/2 inches. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the anchor aligns as closely as possible with the direction of the wire.
    - a. Wire turns made by machine where both strands have been deformed or bent in wrapping can waive the 1-1/2 inch requirement, but the number of turns should be maintained, and be as tight as possible.
  8. Separate all ceiling hanger and bracing wires at least six (6) inches from all unbraced ducts, pipes, conduit, etc.
  9. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, 1 out of 10 must be field tested for 200 lbs. in tension. When drilled-in concrete anchors are used for bracing wires, 1 out of 2 must be field tested for 440 lbs. in tension. Shot-in anchors

in concrete are not permitted for bracing wires. If any shot-in or drilled-in anchor fails, see CBC, Section 1901A.3.

- a. Drilled-in or shot-in anchors require special DSA approval prior to use in prestressed concrete.
10. Attach all light fixtures and ceiling mounted air terminals, to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Screws or approved fasteners are required.
11. Flush or recessed light fixtures and air terminals, weighing less than 56 lbs., may be supported directly on the runners of a heavy duty grid system but, in addition, they must have a minimum of two (2) #12 gage slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. All 4 ft. by 4 ft. light fixtures must have slack safety wires at each corner. All flush or recessed light fixtures and air terminals weighing 56 lbs. or more must be independently supported by not less than four (4) taut #12 gage wires, each attached to the fixture and to the structure above regardless of the type of ceiling grid system used. The four (4) taut #12 gage wires, including their attachment to the structure above, must be capable of supporting four (4) times the weight of the unit.
12. All fixtures and air terminals supported on intermediate duty grid systems must be independently supported by not less than four (4) taut #12 gage wires each attached to the fixture or terminal, and to the structure above.
13. Support surface mounted light fixtures by at least two positive devices which surround the ceiling runner and which are each supported from the structure above by a #12 gage wire. Spring clips or clamps that connect only to the runner are not acceptable. Provide additional supports when light fixtures are 8 ft. or longer.
14. Support pendant mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting four (4) times the weight of the fixture. A bracing assembly is required where the pendant hanger penetrates the ceiling. See plans for special details required to attach the pendant hanger to the bracing assembly to transmit horizon forces.

END OF SECTION 09 53 00

SECTION 09 65 19.13 – RUBBER- RESILIENT TILE FLOORING AND BASE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient Tile Flooring:
  - 1. Rubber floor tiling with raised profiles.
  - 2. Rubber floor tiling with smooth profiles.
  - 3. Walk-off rubber floor tiling.
- B. Resilient Wall Base
  - 1. Rubber wall base (Type TS).
- C. Accessories
  - 1. Concrete Slab Primer, Leveling and Underlayment Compound, Color Caulk, Patching Compound, Transition Strips, Thresholds, Edge Strips, and Adhesives.

1.2 RELATED SECTIONS

- A. Section 01 35 00 - Sustainable Design Requirements.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 03 35 00 - Concrete Floor Finishing.
- D. Section 06 10 00 - Rough Carpentry.
- E. Section 12 32 16 - Plastic Laminate-Clad Casework.

1.3 REFERENCES

- A. ASTM International (ASTM):
  - 1. ASTM C 501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
  - 2. ASTM D 395 - Standard Test Methods for Rubber Property -Compression Set.
  - 3. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
  - 4. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
  - 5. ASTM D 2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
  - 6. ASTM D 2240 - Standard Test Method for Rubber Property - Durometer Hardness.
  - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 8. ASTM E 492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
  - 9. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
  - 10. ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
  - 11. ASTM E 2129 - Standard Practice for Data Collection for Sustainability Assessment of Building Products.
  - 12. ASTM F 137 - Standard Test Method for Flexibility of Resilient Flooring Materials
  - 13. ASTM F 150 - Standard Test Method for Electrical Resistance of Conductive Resilient Flooring.

14. ASTM F 710 - Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
15. ASTM F 925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.
16. ASTM F 970 - Standard Test Method for Static Load Limit.
17. ASTM F 1344 - Standard Specification for Rubber Floor Tile.
18. ASTM F 1861 - Standard Specification Resilient Wall Base.

B. Federal Standards (Fed. Std.):

1. Federal Test Method 101B - Test Methods for Packaging Materials.
2. Federal Test Method 3221 - Test Methods for Indentation.
3. Federal Test Method 4046 - Test Methods for Electrostatic Properties of Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two full size samples, representing actual product, color, and patterns.
- E. USGBC LEED Submittals: Submit the following:
  1. Recycled content of products.
  2. Volatile organic compound (VOC) levels for adhesives.
  3. Manufacturing plant location.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Regularly engaged in manufacturing resilient flooring, and capable of providing field service representation during construction, approving acceptable installers and approving application methods.
- B. Installer Qualifications: Minimum 5 years experience installing similar products.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  1. Finish areas designated by Architect.
  2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  3. Refinish mock-up area as required to produce acceptable work.
  4. Approved mock-up may be incorporated into finished work.
- D. Single Source Responsibility: Provide resilient flooring and accessories supplied by one manufacturer, including leveling strips, moldings and adhesives.

1.6 COMPLIANCE STANDARDS

- A. Low Emitting Material
  1. FloorScore certified.

- B. Slip Resistance
  - 1. Minimum coefficient of friction to be 0.6 per ASTM D2047.
  - 2. Resilient Flooring shall be stable, firm and slip resistance. CBC Section 11B-302.1.
- C. Fire Performance
  - 1. Critical radiant flux: Class 1; greater than 1.07 watts per square centimeter per ASTM E648.
  - 2. Surface Burning Characteristics
    - a. Class B per ASTM E84.
    - b. Flame spread: 50, maximum
    - c. Smoke Developed: 450, maximum

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging, within absolute limits recommended by manufacturer for environmental conditions, until ready for installation.
- B. Store materials in an enclosed space, off the ground, and protected from the weather. Protect adhesives from freezing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.8 PROJECT CONDITIONS

- A. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65 degrees F (18 degrees C) and a maximum temperature of 85 degrees F (29 degrees C) for at least 48 hours before, during, and for not less than 48 hours after installation.

#### 1.9 WARRANTY

- A. Manufacturer's Standard Warranty for Defects in Material: Provide manufacturer's standard limited warranty for defects in material.
  - 1. Rubber Floor Tiling: 5 years.
  - 2. Walk-Off Rubber Floor Tiling: 6 years.
  - 3. Rubber Wall Base and Accessories: 2 years.
- B. Manufacturer's Standard Warranty for Wear: Provide manufacturer's standard limited 10-year wear warranty for wear.

### PART 2 PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Resilient Flooring and Wall Base
  - 1. Burke Flooring Products
    - a. [www.burkeflooring.com](http://www.burkeflooring.com)
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

#### 2.2 RUBBER FLOOR TILING WITH RAISED PROFILES

- A. Multi-Color Tiles
  - 1. Product: Burke Endura Flecksibles.
  - 2. Description: Multi-color tiles with raised profiles and sanded back.
  - 3. Color: SpectraFlecks as selected by Architect from manufacturer's

- 4. Surface Profile: standard options.  
As selected by Architect from manufacturer's standard and special order options.
- 5. Size: Per surface profile selected, 0.125" thick.
- 6. Location: Per drawings.

B. Solid Color Tiles

- 1. Product: Burke Endura Solid Color.
- 2. Description: Solid color tiles with raised profiles and sanded back.
- 3. Color: SpectraSolids as selected by Architect from manufacturer's standard options.
- 4. Surface Profile: As selected by Architect from manufacturer's standard and special order options.
- 5. Size: Per surface profile selected.
- 6. Location: Per drawings.

2.3 RUBBER FLOOR TILING WITH SMOOTH PROFILES

A. Multi-Color Tiles

- 1. Product: Burke Endura SimplySmooth Flecksibles.
- 2. Description: Multi-color smooth tiles with sanded back.
- 3. Color: SpectraFlecks as selected by Architect from manufacturer's standard options.
- 4. Surface Profile: SimplySmooth.
- 5. Size: 35.5" x 35.5", 0.125" thick.
- 6. Location: Per drawings.

B. Solid Color Tiles

- 1. Product: Burke Endura SimplySmooth Solid Color.
- 2. Description: Solid color smooth tiles with smooth sanded back.
- 3. Color: SpectraSolids as selected by Architect from manufacturer's standard options.
- 4. Surface Profile: SimplySmooth.
- 5. Size: 35.5" x 35.5", 0.100" thick.
- 6. Location: Per drawings.

C. Patterned Tiles

- 1. Product: Burke Marble.
- 2. Description: Marbled molded tiles.
- 3. Color: As selected by Architect from Uni-Color range.
- 4. Surface Profile: Standard.
- 5. Size: 12" x 12", 0.125" thick.
- 6. Location: Per drawings.

2.4 WALK-OFF RUBBER FLOOR TILING

A. Interior Locations

- 1. Product: Burke BurkeTurf.
- 2. Description: Anti-slip tiles engineered for indoor and outdoor locations.
- 3. Color: As selected by Architect from manufacturer's standard options.
- 4. Surface Profile: Standard.
- 5. Size: 12" x 12", 3/8" thick +/- 1/8" tolerance.
- 6. Location: Per drawings.

2.5 RESILIENT WALL BASE

- A. Rubber Wall Base
  - 1. Product: Burke Profiles Wall Base.
  - 2. Description: Type TP Co-extruded thermoplastic rubber wall base with factory mitered corners.
  - 3. Color: As selected by Architect from manufacturer's standard options.
  - 4. Finish: Smooth satin finish.
  - 5. Profile: As selected by Architect from manufacturer's standard options.
  - 6. Size: Per profile selected.
  - 7. Location: Per drawings.

## 2.6 ACCESSORIES

- A. Concrete Slab Primer: Non-staining type as required by resilient accessories manufacturer.
- B. Leveling and Underlayment Compound: Latex cementitious type as required by resilient accessories manufacturer, having a minimum density of 4000 lbs per sq. ft. after 28 days.
- C. Burke Color Caulk: For finish and touchup. Use a flexible non-solvent base acrylic adhesive or equal on all tile installations unless other types of adhesives are recommended by manufacturer.
- D. Patching Compound: For patching, smoothing, and leveling monolithic sub-floors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), provide cementitious based patching compound with a minimum compressive strength of 3,500 psi.
- E. Transition Strips: Transition/reducing strips tapered to meet abutting materials.
- F. Thresholds: Thresholds of thickness and width as shown on the Drawings.
- G. Resilient Edge Strips: Resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.
- H. Metal Edge Strips: Metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.
- I. Adhesives: As recommended by manufacturer for specified applications.
  - 1. Burke BR 101: Acrylic wall base adhesive by Burke Flooring Products.
  - 2. Burke BR-710: Flooring adhesive by Burke Flooring Products.
    - a. Description: Part polyurethane adhesive.
  - 3. Burke BR-711: Flooring adhesive by Burke Flooring Products.
    - a. Description: A solvent-free aqueous acrylic adhesive that only needs to be applied to one surface, allows repositioning of the tile during installation.
  - 4. Burke BR-721: Flooring adhesive by Burke Flooring Products.
    - a. Description: Solvent free, two part epoxy flooring adhesive by Burke Flooring Products.
  - 5. Burke BR-725: Flooring adhesive by Burke Flooring Products.
    - a. Description: Two part flooring polyurethane adhesive by Burke Flooring Products.

## PART 3 EXECUTION

### 3.1 EXAMINATION



- A. Prior to installation, verify substrate is prepared in accordance with manufacturer's recommendations. Do not begin installation until substrates have been properly prepared.
  - 1. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
  - 2. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
  - 3. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with manufacturer's recommended bond and moisture tests.
  - 4. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with manufacturer's recommended bond and moisture tests.
- B. If substrate preparation is the responsibility of another installer, do not proceed with installation. Notify Architect of unsatisfactory preparation immediately.

### 3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with fast-setting cement-based underlayment or fast-setting cement-based patch and skim coat as recommended by the flooring manufacturer.
- C. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.
- D. Perform subfloor Calcium Chloride Tests (and Bond Tests) to determine if surfaces are dry and within manufacturer's standard limits; free of curing and hardening compounds, old adhesive and other coatings; and ready to receive flooring.
- E. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.
- F. Acclimatize flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.
- G. Install flooring and accessories after the other finishing operations, including painting, have been completed but prior to acoustic ceiling tiles.
- H. Beginning of substrate preparation constitutes Installer's acceptance of substrate conditions.

### 3.3 INSTALLATION OF RESILIENT FLOORING

- A. Install flooring in strict accordance with the latest edition of the manufacturer's installation instructions. Install flooring wall to wall before the installation of furniture, equipment, or movable partitions. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.
- B. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and

built-in furniture and cabinets. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

#### 3.4 INSTALLATION OF RESILIENT WALL BASE

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates. Do not stretch wall base during installation.
- D. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- E. Pre-Molded Corners: Install pre-molded interior and exterior corners before installing straight pieces.

#### 3.5 CLEANING AND PROTECTION

- A. Perform initial maintenance according to manufacturer's maintenance instructions.
- B. Protect installed flooring and wall base from traffic for 48 hours after installation.
- C. Protect installed flooring and wall base as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings until completion of project.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09 65 19.13

SECTION 09 68 13 CARPET TILES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Carpet Tiles as indicated on the Drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Carpet Tiles furnished by owner, installed by contractor
  - 2. Carpet Base
  - 3. Accessories
  - 4. Walk Off Mat

1.02 REFERENCES

- A. ASTM D 418-93, Standard Test Methods for Testing Pile Yarn Covering Construction.
- B. ASTM D 2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
- C. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- D. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit shop drawings showing seaming plan, method of joining seams and direction of carpet based on field measurements.
- C. Submit product data on specified products, describing physical and performance characteristics; sizes, patterns, colors available and method of installation.
- D. Submit three samples 12 x 12 inch in size illustrating color and pattern for each carpet material specified.
- E. Submit 12" length of base with bound edge.
- F. Submit manufacturer's installation instructions.
- G. Operation and Maintenance Data:
  - 1. Submit operation and maintenance.
  - 2. Include maintenance procedures, recommended maintenance materials and suggested schedule for cleaning and shampooing.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in carpet with ten years minimum experience.
- B. Installer shall have the following qualifications: At least one member of the installation crew shall be certified by the International Certified Floorcovering Installation Association ( CFI ) at C-2 or Master Level. CFI certification can be verified at 816 880 9999. The certified member of the installation crew shall be present whenever work of this Section is being performed.
- C. The installer shall be approved by the carpet manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials and accessories necessary for completion of carpet installation to the site before beginning installation of carpet.
- B. Label each case of carpet to certify by register and case numbers that carpet shipped for Project complies with requirements of contract documents and is identified as follows.
  - 1. Carpet Manufacturer and product name.
  - 2. Fiber content.
  - 3. Carpet specification.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Store materials in sufficient time prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature three days prior to, during and 24 hours after installation of materials.

1.07 FIRE CLASSIFICATION REQUIREMENTS

- A. NFPA 258 National Fire Protection Association, Standard Test Method for Determining Smoke Generation of Solid Materials.
  - 1. Smoke Developed: Less than 450.

1.08 SEQUENCING

- A. Carpet installation shall not commence until finish work on interior surfaces of walls, ceilings, and floors is complete.

1.09 EXTRA MATERIALS

- A. Provide an average of 3 percent of carpeting of each color specified; not less than 160 tiles.
- B. Provide 25 lineal feet minimum of carpet cove base with bound edge for each type.

1.10 GUARANTEE

- A. Provide 5 year written guarantee on installation by floor covering installer accompanied by written certification from the Carpet Manufacturer verifying specified requirements have been met. Guarantee shall cover defects in workmanship and include statement that carpet installer shall, at no additional expense to Owner and upon written notice from Owner, promptly correct or replace improper work

and material that may become apparent within 60 months after date of final completion. Installer shall complete corrective work within 15 days of receipt of Owner's written notice unless other arrangements are made in writing with Owner.

- B. Provide Carpet Manufacturer's 10 year guarantee on carpet including specific workmanship guarantees for delamination, edge raveling, fuzzing, pilling and other textural changes which can be controlled through proper manufacturing.

#### 1.11 MINIMUM ACCESSIBLE REQUIREMENTS

- A. Carpet shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad that complies with CBC Section 11B-302.2. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be 1/2" maximum.
- B. Exposed edges shall be fastened to floor surfaces and shall have trim on entire length. Carprt edges shall comply with CBC Section 11B-303.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Mohawk Industries: <http://www.mohawkind.com>
- B. Or approved equal by
  - 1. Tandus US, Inc <http://www.tandus.com>
  - 1. Shaw Contract Group: <http://www.shawcontractgroup.com>

#### 2.02 CARPET TILE – FIELD COLOR #1

- A. Mohawk Style GT091 BY THE BOOK
  - 1. Color: 327 Brainy.
  - 2. Backing: Carpet Tile, Solid Rubber Backing
  - 3. Location: Library Building

#### 2.03 CARPET COVE BASE

- A. Made of same carpet from manufacturer as used on adjacent floor. Top edge of base shall be surged with 1-1/4 inch polyester binding fabric to coordinate with selected carpet. Roll edges of binding fabric under and sew along top edge of carpet cove base.
- B. Location and size as indicated on drawings. Provide carpet base at Library Building

#### 2.04 ACCESSORIES

- A. Reducers Strips and Accessories
  - 1. Acceptable Manufacturers/Supplier
    - a. Johnson Rubber Company: <http://www.johnsonrubber.com>
  - 2. Or approved equal by

- a. Roppe Corporation: <http://www.roppe.com>
- b. Mercer Products Co., Inc.: <http://www.mercerproducts.com>
- c. Flexco Company: <http://www.flexco.com>
- d. AFCO, Inc.: <http://www.afco-usa.com>

3. Reducer Strips and Accessories:

- a. 1/4 inch carpet to 1/8 inch resilient flooring adapter: CTA-A.
- b. 1/4 inch carpet to 3/16 inch resilient flooring adapter: CTA-B.
- c. 3/16 inch carpet butting gauge: EG-F.
- d. 1/4 inch carpet butting gauge: EG-E.

B. Filler and Adhesive

1. Subfloor Filler: Latex based underlayment acceptable to the manufacturer.
2. Seam Sealer: As per manufacturer.
3. Primers and Adhesives: Type recommended by carpet manufacturer. NU-BROADLK PREMIUM PLUS.

C. Walk off area: Mohawk Mat. Provide walk off mat at all entrance locations

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft, and are ready to receive work.
- B. Prior to ordering flooring materials, contractor shall conduct calcium chloride “dome” test to verify that concrete floors are dry with maximum moisture vapor emissions of three lbs per 1000 sf in 24 hours, and exhibit negative alkalinity, carbonization or dusting. Apply moisture test in four (4) different areas of each floor location with at least one test for each 1,000 sf of floor area.
- C. Ordering of flooring materials and beginning of installation means acceptance of existing substrate and site conditions.
- D. Notify Architect in writing if floor surface is not acceptable to install carpet. Do not lay carpet over unsuitable surface.

3.02 PREPARATION

- A. Concrete slab moisture vapor emissions not to exceed maximum 3 lbs. per 100 sf in 24 hours as specified herein at the time of installation of adhesive applied floor covering as herein specified.
- B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with subfloor filler.
- C. Apply, trowel and float filler to leave a smooth, flat, hard surface, free of bumps or depressions of any size.
- D. Prohibit traffic from area until filler is cured.
- E. Vacuum clean substrate.

- F. Apply primer as recommended by the materials manufacturer.

### 3.03 INSTALLATION, GLUE DOWN

- A. Apply carpet and adhesive in accordance with manufacturer's instructions.
- B. Lay out carpet tiles for approval.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Double cut carpet to allow intended seam and pattern match. Make cuts straight, true and unfrayed. Edge seam carpet where required to prevent fraying.
- E. Locate seams in area of least traffic. Install seams in corridors perpendicular to line of traffic.
- F. Fit seams straight, not crowded or peaked, free of gaps.
- G. Lay carpet on floors with run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.
- H. Cut and fit carpet around interruptions. Extend carpets into cabinets which do not contain bottoms.
- I. Fit carpet tight to intersection with vertical surfaces without gaps.
- J. Install edge guards in lengths as long as possible. Firmly adhere to surfaces with adhesive recommended by the manufacturer.

### 3.04 CARPET BASE

- A. Seams shall occur where possible at inside corners.
- B. Scribe to floor.
- C. Spread adhesive over entire back side of base to bottom of bound edge. Base shall be attached solid from top edge to bottom edge.
- D. Finish edge of base that terminate at door frame or vertical edge with 45 degree angle "birdsmouth" cut to bound edge turns down to contact frame.
- E. Do not allow adhesive beyond edge of base.

### 3.05 CLEANING

- A. Remove excessive adhesive from floor, base and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

### 3.06 PROTECTION

- A. Prohibit traffic from carpet areas for 24 hours after installation.
- B. Prohibit wheeled traffic for 72 hours after installation.

END OF SECTION 09 68 13



SECTION 09 68 16 SHEET CARPET

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Sheet Carpet as indicated on the Drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Sheet Carpet
  - 2. Carpet Base
  - 3. Accessories
  - 4. Walk Off Area

1.02 REFERENCES

- A. ASTM D 418-93, Standard Test Methods for Testing Pile Yarn Covering Construction.
- B. ASTM D 2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
- C. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- D. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit shop drawings showing seaming plan, method of joining seams and direction of carpet based on field measurements.
- C. Submit product data on specified products, describing physical and performance characteristics; sizes, patterns, colors available and method of installation.
- D. Submit three samples 12 x 12 inch in size illustrating color and pattern for each carpet material specified.
- E. Submit 12" length of base with bound edge.
- F. Submit manufacturer's installation instructions.
- G. Operation and Maintenance Data:
  - 1. Submit operation and maintenance.
  - 2. Include maintenance procedures, recommended maintenance materials and suggested schedule for cleaning and shampooing.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in carpet with ten years minimum experience.
- B. Installer shall have the following qualifications: At least one member of the installation crew shall be certified by the International Certified Floorcovering Installation Association ( CFI ) at C-2 or Master Level. CFI certification can be verified at 816 880 9999. The certified member of the installation crew shall be present whenever work of this Section is being performed.
- C. The installer shall be approved by the carpet manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials and accessories necessary for completion of carpet installation to the site before beginning installation of carpet.
- B. Label each roll of carpet to certify by register and roll numbers that carpet shipped for Project complies with requirements of contract documents and is identified as follows.
  - 1. Carpet Manufacturer and product name.
  - 2. Fiber content.
  - 3. Carpet specification.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Store materials in sufficient time prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature three days prior to, during and 24 hours after installation of materials.

1.07 FIRE CLASSIFICATION REQUIREMENTS

- A. NFPA 258 National Fire Protection Association, Standard Test Method for Determining Smoke Generation of Solid Materials.
  - 1. Smoke Developed: Less than 450.

1.08 SEQUENCING

- A. Carpet installation shall not commence until finish work on interior surfaces of walls, ceilings, and floors is complete.

1.09 EXTRA MATERIALS

- A. Provide an average of 3 percent in usable size of carpeting of each color specified. Not less than 10 yds.
- B. Provide 25 lineal minimum of carpet cove base with bound edge.

1.10 GUARANTEE

- A. Provide 5 year written guarantee on installation by floor covering installer accompanied by written certification from the Carpet Manufacturer verifying specified requirements have been met. Guarantee shall cover defects in workmanship and include statement that carpet installer shall, at no additional

expense to Owner and upon written notice from Owner, promptly correct or replace improper work and material that may become apparent within 60 months after date of final completion. Installer shall complete corrective work within 15 days of receipt of Owner's written notice unless other arrangements are made in writing with Owner.

- B. Provide Carpet Manufacturer's 10 year guarantee on carpet including specific workmanship guarantees for delamination, edge raveling, fuzzing, pilling and other textural changes which can be controlled through proper manufacturing.

#### 1.11 MINIMUM ACCESSIBLE REQUIREMENTS

- A. Carpet shall be securely attached and shall have firm cushion, pad, or backing or no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level-cut/uncut pile texture. Pile height shall be 1/2" maximum per CBC Section 11B-302.2.
- B. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length. Carpet edges shall comply with CBC Section 11B-302.2.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Tandus US, Inc.

- 1. <http://www.tandus.com>

- B. Or approved equal by

- 1. Mohawk Industries: <http://www.mohawkind.com>
  - 2. Shaw Contract Group: <http://www.shawcontractgroup.com>
  - 3. J & J Industries: <http://www.jjindustries.com>
  - 4. Bentley Mills, Inc.: <http://www.bentleyprincestreet.com>
  - 5. Interface Flooring Systems Inc: <http://www.interfaceinc.com>
  - 6. Atlas Carpet Mills, Inc.: <http://www.atlascarpetmills.com>
  - 7. Blue Ridge Carpet: <http://www.blueridgecarpet.com>
  - 8. Patcraft Commercial Carpet: <http://www.thenewpatcraftdesignweave.com>
  - 9. Mannington Mills, Inc.: <http://www.mannington.com>

#### 2.02 SHEET CARPET – FIELD COLOR #1

- A. C&A Tazo, style #02514.

- 1. Color: 21505 Chamois.
  - 2. Construction: Accuweave Patterned Loop.
  - 3. Gauge: 1/12.
  - 4. Stitches per Inch: 9.4.
  - 5. Pile Ht Average: 0.187".
  - 6. Fiber System: Antron Legacy Nylon.
  - 7. Dye Method: 65% Solution Dyed / 35% Yarn Dyed.
  - 8. Primary Backing: Non-woven synthetic fiber.
  - 9. Stain Protection: Ensure.
  - 10. Stock Width: 6' roll.

#### 2.03 SHEET CARPET – FIELD COLOR #2

A. C&A Aftermath, style #03026.

1. Color: 23501 Hopsack.
2. Construction: Stratatec Patterned Loop.
3. Gauge: 5/64.
4. Stitches per Inch: 8.5.
5. Tuft Density: 108.8 tufts/sq in.
6. Pile Ht Average: 0.187".
7. Fiber System: TDX Nylon.
8. Dye Method: 90% Solution Dyed, 10% Yarn Dyed.
9. Primary Backing: Non-woven synthetic fiber.
10. Stain Protection: Ensure.
11. Stock Width: 6' roll.

2.04 CARPET COVE BASE

- A. Made of same carpet from manufacturer as used on adjacent floor. Top edge of base shall be surged with 1-1/4 inch polyester binding fabric to coordinate with selected carpet. Roll edges of binding fabric under and sew along top edge of carpet cove base.
- B. Location and size as indicated on drawings.

2.05 ACCESSORIES

A. Reducers Strips and Accessories

1. Acceptable Manufacturers/Supplier
  - a. Johnson Rubber Company: <http://www.johnsonrubber.com>
  2. Or approved equal by
    - a. Roppe Corporation: <http://www.roppe.com>
    - b. Mercer Products Co., Inc.: <http://www.mercerproducts.com>
    - c. Flexco Company: <http://www.flexco.com>
    - d. AFCO, Inc.: <http://www.afco-usa.com>
  3. Reducer Strips and Accessories:
    - a. 1/4 inch carpet to 1/8 inch resilient flooring adapter: CTA-A.
    - b. 1/4 inch carpet to 3/16 inch resilient flooring adapter: CTA-B.
    - c. 3/16 inch carpet butting gauge: EG-F.
    - d. 1/4 inch carpet butting gauge: EG-E.

B. Filler and Adhesive

1. Subfloor Filler: Latex based underlayment acceptable to the manufacturer.
2. Seam Sealer: As per manufacturer.
3. Primers and Adhesives: Type recommended by carpet manufacturer. NU-BROADLK PREMIUM PLUS.

C. Walk off area: C&A GeoTile Mat

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft, and are ready to receive work.
- B. Prior to ordering flooring materials, contractor shall conduct calcium chloride “dome” test to verify that concrete floors are dry with maximum moisture vapor emissions of three lbs per 1000 sf in 24 hours, and exhibit negative alkalinity, carbonization or dusting. Apply moisture test in four (4) different areas of each floor location with at least one test for each 1,000 sf of floor area.
- C. Ordering of flooring materials and beginning of installation means acceptance of existing substrate and site conditions.
- D. Notify Architect in writing if floor surface is not acceptable to install carpet. Do not lay carpet over unsuitable surface.

3.02 PREPARATION

- A. Concrete slab moisture vapor emissions not to exceed maximum 3 lbs. per 100 sf in 24 hours as specified herein at the time of installation of adhesive applied floor covering as herein specified.
- B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with subfloor filler.
- C. Apply, trowel and float filler to leave a smooth, flat, hard surface, free of bumps or depressions of any size.
- D. Prohibit traffic from area until filler is cured.
- E. Vacuum clean substrate.
- F. Apply primer as recommended by the materials manufacturer.

3.03 INSTALLATION, GLUE DOWN

- A. Apply carpet and adhesive in accordance with manufacturer’s instructions.
- B. Lay out rolls of carpet for approval.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Double cut carpet to allow intended seam and pattern match. Make cuts straight, true and unfrayed. Edge seam carpet where required to prevent fraying.
- E. Locate seams in area of least traffic. Install seams in corridors perpendicular to line of traffic.
- F. Fit seams straight, not crowded or peaked, free of gaps.
- G. Lay carpet on floors with run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.
- H. Cut and fit carpet around interruptions. Extend carpets into cabinets which do not contain bottoms.

- I. Fit carpet tight to intersection with vertical surfaces without gaps.
- J. Install edge guards in lengths as long as possible. Firmly adhere to surfaces with adhesive recommended by the manufacturer.

3.04 CARPET BASE

- A. Seams shall occur where possible at inside corners.
- B. Scribe to floor.
- C. Spread adhesive over entire back side of base to bottom of bound edge. Base shall be attached solid from top edge to bottom edge.
- D. Finish edge of base that terminate at door frame or vertical edge with 45 degree angle “birdsmouth” cut to bound edge turns down to contact frame.
- E. Do not allow adhesive beyond edge of base.

3.05 CLEANING

- A. Remove excessive adhesive from floor, base and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

3.06 PROTECTION

- A. Prohibit traffic from carpet areas for 24 hours after installation.
- B. Prohibit wheeled traffic for 72 hours after installation.

END OF SECTION 09 68 16

SECTION 09 91 00 PAINTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Painting, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Surface preparation.
  - 2. Prime coat application.
  - 3. Finish coat application.
  - 4. Upon completion of work under this contract, all surfaces within the contract limits and within vision, shall have a painters finish on the interior and exterior except excluded items defined herein. Include all roof mounted mechanical and electrical equipment which do not have factory finish. The surfaces to be painted include, but are not limited to the following:
    - a. Interior Gypsum Board
    - b. Interior and Exterior Hollow Metal Doors and Frames
    - c. Exterior Plaster
- C. Related Sections:
  - 1. Division 05 Sections for shop priming of metal substrates with primers specified in Division 05.
- D. Work not included:
  - 1. Surfaces not to be painted:
    - a. Prefinished wall, ceiling and floor coverings.
    - b. Items with factory-applied final finish.
    - c. Concealed ducts, pipes and conduit.
    - d. Glass, plastic laminate, ceramic tile, anodized aluminum.
    - e. Steel items embedded in concrete.
    - f. Surfaces specifically scheduled or noted on the drawings not be painted.
    - g. Fire-rated labels on doors or frames.
    - h. Exterior Plaster
    - i. Pre-Finished Interior Wood Doors

1.02 REFERENCES

- A. AQMD – Air Quality Management District, Local Regulations.
- B. ASTM D4442 – Direct Moisture Content Measurement of Wood and Wood-Base Materials.
- C. ASTM D4444 – Use and Calibration of Hand-Held Moisture Meters.
- D. MPI – Master Painters Institute

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
  - 1. Submit samples on rigid backing, 8-1/2" x 11".
  - 2. Step coats on samples to show each coat required for system.
  - 3. Label each coat of each sample.
  - 4. Label each sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on drawings and in schedules.
  - 2. Printout of current "MPI Approved Product List" for each product category specified in Part 2, with the proposed product highlighted.
- E. LEED Submittal:
  - 1. Product Data for Credit MR 4 and MR 5: For products having recycled content and/or regional materials content, submit recycled content and regional materials documentation for each such product provided under work of this Section.
  - 2. Product Data for Credit EQ 4.2: For paints and coatings, certify each interior field-applied paint and coating product meets the VOC requirements.
    - a. Include manufacturer's product data sheet and Material Safety Data Sheet (MSDS) highlighting VOC content for each product.

#### 1.04 QUALITY ASSURANCE

- A. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft.
    - b. Other Items: Architect will designate items or areas required.
  - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
  - 3. Final approval of floor selections will be based on benchmark samples.



- a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.
  - C. Regulatory Requirements: Materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous materials in paint. Comply with governmental and local regulations for field applied products.
  - D. 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, at no additional cost to the Owner.
  - E. Employ coats and undercoats for types of finishes in accordance with the recommendations of the paint manufacturer whose products are used.
- 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to the project site in unopened containers bearing manufacturer's name and product descriptions corresponding to designation on material list.
  - B. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area unless permitted otherwise by manufacturer's instructions.
  - C. Protection: Protect floors and adjacent surfaces from paint smears, spatters, and droppings. Cover fixtures not to be painted. Mask off areas where necessary. Exercise care to prevent paint from contacting surfaces not to be painted. During painting of exterior work, cover windows, doors, concrete, and other surfaces not to be painted.
- 1.06 PROJECT REQUIREMENTS
- A. Environmental Requirements:
    - 1. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during and 48 hours after application of finishes, unless permitted otherwise by manufacturer's instructions.
    - 2. Do not apply exterior coatings during rain, or when relative humidity is above 50 percent, unless permitted otherwise by manufacturer's instructions.
    - 3. Minimum application temperatures for Latex paints: 45 degrees F for interiors; 50 degrees F for exterior; unless permitted otherwise by manufacturer's instructions.
    - 4. Minimum application temperature for Varnish and transparent finishes: 65 degrees F for interior or exterior, unless permitted otherwise by manufacturer's instructions.
    - 5. Provide lighting level sufficient to conduct painting operations.
  - B. Hardware: Remove hardware before painting is started and replace only when paint finishes are thoroughly dry.
- 1.07 EXTRA STOCK
- A. Provide a one gallon container of each color, type and gloss of paint used in the work.
  - B. Label each container with color, texture and room locations in addition to the manufacturer's label.
- 1.08 WARRANTY

- A. Guarantee the painting work against peeling, fading, cracking, blistering or crazing for a period of two years from the Date of Substantial Completion.
- B. Water Repellent: Provide 10 year warranty. A site visit shall be conducted by an agent of RAINGUARD and warranty application shall be completed by applicator.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Manufacturers:
  - 1. Products of the following manufacturer or supplier form the basis for design and quality intended.
    - a. ICI Paints, North America, Los Angeles, CA.
  - 2. Equal products of the following may be submitted for approval:
    - a. Dunn-Edwards Corporation, Los Angeles, CA.
    - b. Frazee Paint and Wallcovering, Inc., City of Commerce, CA.
    - c. Sherwin Williams Paint Co.
    - d. Vista Paint
  - 3. Or approved equal.
  - 4. The Construction Specification Institute ( CSI ) shall be used to cross reference paint products from different manufacturers.
- B. Materials:
  - 1. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and iniformly dispersed to a homogeneous coating.
  - 2. Colors and Glosses: The Architect will select color and hue to be used in the various types of paint specified and will be the sole judge of acceptability of the various glosses obtained from the materials proposed to be used in the work.
  - 3. Undercoats and Thinners: Provide undercoat paint produced by the same naufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat and thinner material as parts of a unified system of paint finish.
  - 4. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
  - 5. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified of commercial quality.
- C. Application Equipment:
  - 1. For application of the approved paint, use only such equipment as is recommended by the manufacturer.
  - 2. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by use of the proposed application equipment.

## PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of new 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, measured in accordance with ASTM D4442 and ASTM D4444.
  - 4. Exterior Located Wood: 19 percent, measured in accordance with ASTM D4442 and ASTM D4444.
- D. Beginning of installation means acceptance of existing surfaces.

3.02 MATERIALS PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Store materials not in actual use in tightly covered containers.
- C. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue.
- D. Stir all materials before application to produce a mixture of uniform density and as required during the application of materials. Do not stir into the material any film which may form on the surface. Remove the film and strain the material before using.

3.03 PREPARATION

- A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulates.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

- D. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

#### 3.04 PROTECTION

- 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.

#### 3.05 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish. Number of coats specified is a minimum. Additional coats shall be applied at no extra cost, if coatings show evidence of uneven application, uneven pigmentation, brush strokes or otherwise unsatisfactory distribution of material.
- D. Under coats shall be lighter and brighter in tint than finish coat.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Prime back surfaces of interior and exterior woodwork with primer paint.
- I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- J. Seal tops, bottoms and cutouts for hardware and accessories of wood or plastic laminate covered doors.
- K. Split paint door frames to match color of walls on each side of opening.
- L. The number of coats of each product specified in the finish schedule is the minimum required. Contractor shall provide additional coats as required to produce proper finish.

3.06 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.
- D. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- E. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers and grilles to match face panels.
- F. Paint exposed conduit and electrical equipment occurring in finished area.
- G. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- H. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated. Color band and identify with flow arrows names and numbering, using stencils or other approved systems.
- I. Replace electrical plates, hardware, light fixture trim and fittings removed prior to finishing.

3.07 FINISHING HOLLOW METAL DOORS AND FRAMES

- A. Paint for hollow metal doors and window frames shall be applied with mechanical sprayer.
- B. Paint shall be installed prior to installing finish hardware or hardware shall be installed, removed for painting and reinstalled after painting is complete.

3.08 WATER REPELLANT

- A. Install exterior and interior water repellent as per manufacturer's recommendations for a 10 year warranty.

3.09 PLANETARIUM DOME

- A. All surfaces behind the planetarium dome shall be painted flat black.

3.10 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.11 CLEANING AND PROTECTION

- A. At end of each work day, remove rubbish, empty cans, rags, and other discarded materials from project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.12 PAINT FINISH SCHEDULE

INTERIOR SURFACE	COAT	PRODUCT
Metal Doors and Frames	1	SW Urethane ProCryl B66-310
	2 and 3	SW Acrolon 100 Water Based Urethane Gloss B65 Series
Gypsum Board	1	SW Promar 200 Zero VOC Primer B28W2600
	2 and 3	SW Promar 200 Zero VOC Egg-Shell B20-2600
EXTERIOR SURFACE	COAT	PRODUCT
Metal Doors and Frames	1	SW Urethane ProCryl B66-310
	2 and 3	SW Acrolon 100 Water Based Urethane Gloss B65 Series
Galvanized Metal	1	SW GLL Clean n Etch
	1	SW Procryl B66-310
	2 and 3	SW Shercryl HPA Semigloss B66-350
Existing Plaster	1	SW Loxon Primer A24W8300
	2 and 3	SW A 100 Exterior Latex Satin, A82 Series

END OF SECTION 09 91 00

SECTION 10 11 00 VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Visual Display Boards, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Provide markerboards.
  - 2. Provide tackboards.
  - 3. Provide sliding markerboards.

1.02 REFERENCES

- A. ANSI A208.1 – Mat Formed Wood Particleboard
- B. ASTM A526 – Steel Sheet, Zinc-Coated (galvanized) by the Hot Dip Process, Commercial Quality
- C. ASTM B209 – Aluminum Alloy Sheet and Plate
- D. ASTM B221 – Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
- E. PEI – Porcelain Enamel Institute – Performance Specifications for Porcelain Enamel Markerboards
- F. ANSI A135.4 – Basic Hardboard
- G. ASTM E84 – Surface Burning Characteristics of Building Materials
- H. FS CCC-W-408 – Wall Covering, Vinyl Coated
- I. Chapter 8, California Building Code

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit Shop Drawings: Include dimensioned elevations. Show location of joints between individual panels. Include sections of typical trim members. Show anchors, reinforcement, accessories, layout, and installation details.
- C. Submit product data.
- D. Submit samples illustrating materials and finish, color and texture of each type of visual display board.
- E. Submit manufacturer's installation instruction

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Fire-Test-Response Characteristics: Provide vinyl-fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84. Conform to Table 8-B, California Building Code.
  - a. Maximum Flame Spread: 75.
  - b. Maximum Smoke Density: 450.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Wrap or otherwise package assemblies for protection against damage and staining. Store materials at project site in clean covered area.
- B. Do not deliver to job site until building is enclosed and HVAC system is functioning.

1.06 WARRANTY

- A. Provide five year warranty.
- B. Porcelain Enamel Chalkboard Warranty: Submit a written warranty executed by manufacturer agreeing to replace chalkboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking within the specified warranty period, provided the manufacturer's written instructions for handling, installation, protection, and maintenance have been followed.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Products of the following manufacturer or supplier form the basis for design and quality intended.
  1. ABC School Equipment Inc.
  2. Tri-Best Visual Display Products
  3. Nelson-Adams
  4. Lemco Manufacturing Co.
- B. Porcelain Enamel Markerboards: Balanced, high-pressure-laminated, porcelain enamel markerboard of 3-ply construction consisting of face sheet, core material, and backing.
  1. Model: ABC School Equipment Standard Trim System STS
  2. Face Sheet: ASTM A424, steel, 24 guage thick, with vitreous porcelain enamel finish.
  3. Core: ANSI A208.1, particle board; ½" thick
  4. Backing Sheet: ASTM B209, aluminum sheet, 0.015 inch thick,
  5. Frame: Extruded aluminum.
  6. Chalkrail: CR300 Chalkrail
  7. Accessories: 1" maprail with natural cork insert, MR410., flag holder
- C. Porcelain Enamel Sliding Markerboards: Balanced, high-pressure-laminated, porcelain enamel markerboard of 3-ply construction consisting of face sheet, core material, and backing.
  1. Model: ABC School Equipment Wall Hung Horizontal Sliding Unit WHS
  2. Panels: (1) fixed back panel, (2) tracks, (2) sliding panels sized as per drawings.



3. Face Sheet: ASTM A424, steel, 22 guage thick, with vitreous porcelain enamel finish.
4. Core: ½ inch honeycomb
5. Backing Sheet: ASTM B209, aluminum sheet, 0.015 inch thick,
6. Frame: Extruded aluminum.
7. Chalkrail: CR310 Chalkrail
8. Top Track: GT600 with fascia
9. Bottom Track: BT620 with nylon guides
10. Accessories: 2" maprail with natural cork insert, flag holder

D. Tackboards: Vinyl over ¼ inch cork on ¼" hardboard

1. Model: ABC School Equipment Standard Trim System STS
2. Cork Facing: Fine grain natural cork
3. Hardboard Core: ANSI A135.4, tempered, smooth face, ¼ inch thick
4. TackBoard Covering: Koroseal Wallcoverings, Harborweave II
  - a. Total Weight: 21 oz. PLY
  - b. Roll Width: 54 inches
  - c. Flame Spread Rating: 15
  - d. Smoke Development 20
  - e. Color: As selected by Architect
5. Frame: Extruded aluminum, CH 215

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that surfaces and internal wall blocking are ready to receive work.
- B. Field verify all dimensions.
- C. Beginning of installation means acceptance of substrate conditions.

3.02 INSTALLATION

- A. Install units in accordance with manufacture's instructions.
- B. Where tackboard adjoins markerboard, join panels with extruded aluminum trim.

3.03 CLEANING

- A. Clean units in accordance with manufacturer's instructions.

END OF SECTION 10 11 00

SECTION 10 14 00 SIGNS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Signage, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Room identification signs.
  - 2. Restroom signs
  - 3. Occupancy signs
  - 4. Accessibility signs

1.02 REFERENCES

- A. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- B. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- C. FED-STD-595 – Colors used in Government Procurement.
- D. ASTM D4802 – Poly (Methyl Methacrylate) Acrylic Plastic Sheet.
- E. Chapters 10, 11B and 30 of California Building Code.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit shop drawings listing sign styles, lettering and locations and overall dimensions of each sign.
- C. Submit samples illustrating full size sample sign of each type, style and color specified.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. All Signage shall conform to CBC Section 1007.9 and 11B-703.
  - 2. Tactile exit signage shall be provided per CBC 1011.3.
  - 3. Raised characters shall comply with CBC Section 11B-703.2
    - a. Depth: It shall be 1/32 inch minimum above their background.
    - b. Tactile Character type. Tactile characters on signs shall be sans serif uppercase characters and be duplicated in Contracted ( Grade 2) Braille.
    - c. Tactile Character size. Raised characters shall be a minimum of 5/8 inch and a maximum of 2 inches high based on the letter “I”. CBC Section 11B-703.2.5.
    - d. Finish and contrast: Contrast between characters, symbols and their backgrounds shall have a non glare finish. Character shall contrast with their background with either light

- characters on a dark background or dark characters on a light background. CBC Section 11B-703.5.1.
- e. Proportions: Raised characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60% minimum and 110% maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase letter "I" shall be 15% maximum of the height of the character. CBC 11B-703.4 and 11B-703.6
  - f. Character Spacing: Spacing between individual tactile characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8
  - g. Braille: It shall be contracted ( Grade 2 ) and shall comply with CBC Section 11B703.3 and 11B-703.4. Braille dots shall have adomed and rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
4. Mounting height: A tactile sign shall be located 48" minimum to the baseline of the lowest Braille cells and 60" maximum to the baseline of the highest line of raised characters above the finish floor or ground surface.
5. Mounting location: A tactile sign shall be located on the approach side, as one enters or exits rooms or spaces, and be reached within 0" of the required clear floor space per CBC Section and Figure 11B-703.4.2 as follows
- a. a clear floor space of 18"x18" minimum, centered on the tactile characters, shall be provided beyond the arc of any door swings between the closed position and 45 degree open position.
  - b. On the wall at the latch side of a single door.
  - c. On the inactive leaf of a double door with one active leaf.
  - d. On the nearest adjacent wall where there is no wall space at the latch side of a single door or no space at the right side of a double door with two active leaves.
6. Visual characters shall comply with CBC Section 11B-703.5 and shall be 40" minimum above finish floor or ground.
7. Pictograms shall comply with CBC Section 11B-703.6
8. Symbol of accessibility shall comply with CBC Section 11B-703.7

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Room Identification Signage: Provide room identification signs where indicated. Install on wall adjacent to door latch, on latch side, 60 inches above finished floor to bottom of tactile lettering.
- 1. Materials: Laminated acrylic Plastic Sheet, ASTM D4802, ¼ inch thick
    - a. Upper Layer: Non-glare clear acrylic, 1/8 inch thick.
    - b. Lower Layer: Opaque acrylic, 1/8 inch thick.
  - 2. Fasteners: stainless steel mechanical mounting, vandal / tamper resistant.
  - 3. Color: As selected by Architect
  - 4. Lettering Type Style: Helvetica Medium, caps only
- B. Restroom Signage: Doorways leading to restrooms shall be identified with sign as detailed on drawings.
- 1. Materials: Laminated acrylic Plastic Sheet, ASTM D4802.
  - 2. Male Restroom Signage: As per detail on drawings.
  - 3. Female Restroom Signage: As per detail on drawings.

4. Unisex Restroom Signage: As per detail on drawings.
  5. Fasteners: stainless steel mechanical mounting, vandal / tamper resistant.
  6. Color: As selected by Architect.
  7. Lettering Type Style: sans serif, caps only.
- C. Occupant Load Sign: Provide maximum occupancy load signs where indicated.
1. Materials: Laminated acrylic Plastice Sheet, ASTM D4802, clear ¼ inch thick.
    - a. Upper Layer: Non-glare clear acrylic, 1/8 inch thick.
    - b. Lower Layer: Opaque acrylic, 1/8 inch thick.
  2. Fasteners: stainless steel mechanical mounting, vandal / tamper resistant.
  3. Color: As selected by Architect.
  4. Lettering Type Style: Helvetica Medium.
  5. Obtain occupant load number from Architect.
- D. Accessibility Sign: Provide at each accessible building entrance.
1. Sign shall be visible to persons along approaching pedestrian ways. Provide additional directional signs as indicated on drawings.
  2. Fasteners: stainless steel mechanical mounting, vandal / tamper resistant.
- E. Parking Area Signs:
1. Materials:
    - a. Post mounted and wall mounted signs shall be fabricated from 16 guage enameling iron with porcelain enamel finish.
    - b. Mount signs to post with minimum two 3/16 inch diameter round head bolts with tamperproof nuts, galvanized.
    - c. Posts: 2” diameter galvanized steel pipe weighing a minimum of 3.65 lbs per foot and conforming to ASTM A53, Schedule or 2 inch x 2 inch galvanized steel tubing, weighing a minimum of 4.32 lbs per foot and conforming to ASTM A500, Grade B, 3/16 inch wall thickness.
  2. Traffic Entry Warning Signs: As per drawings.
  3. Parking Stall Signs: As per drawings.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts existing surfaces.

### 3.02 INSTALLATION

- A. Locate signs where indicated, using mounting methods specified. Install level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

1. Post mounted signs: Set post in concrete base minimum 12 inch diameter and 18 inches deep. Signs set in paving shall be mounted in core drilled holes minimum 8 inch diameter and 18 inches deep with top of concrete fill flush to paving.
2. Wall mounted signs shall be installed after painting of wall surface.

3.03 CLEANING

- A. After installation, clean soiled surfaces. Protect units from damage until acceptance by the Owner.

END OF SECTION 10 14 00

SECTION 10 28 13 TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Toilet Room Accessories, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Provide paper and soap dispensers.
  - 2. Provide waste receptacles.
  - 3. Provide warm air dryers
  - 4. Provide mirrors.
  - 5. Provide grab bars
  - 6. Provide underlavatory guards

1.02 SUBMITTALS

- A. Manufacturer's Product Data. Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

1.03 ACCESSIBILITY REQUIREMENTS

- A. Toilet accessories required to be accessible shall be mounted at heights according to CBC Section 11B-602 through 11B-612.
- B. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows
  - 1. 1-1/2" between grab bar and the wall
  - 2. 1-1/2" minimum between the grab bar and projecting objects below and at the ends.
  - 3. 12" minimum between the grab bar and projecting objects above.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Manufacturers: Provide accessories by one of the following:
  - 1. Bradley, ( basis for design )
  - 2. Bobrick
- B. Toilet Paper Dispensers:
  - 1. Model: Bradley 522
  - 2. Quantity: Provide (1) at each toilet
  - 3. Location: Verify with Architect.

4. Accessible stall: Bradley 5412
- C. Paper towel dispenser and waste receptacle:
1. Model: Bradley 2017-10, semi-recessed Bradex.
  2. Quantity: Provide (1) at single use toilet rooms. Provide (2) at joint use toilet rooms.
  3. Location: Verify with Architect.
- D. Feminine Napkin Disposal:
1. Model: Bradley 4731-15, recessed.
  2. Quantity: Provide (1) at each female toilet.
  3. Location: Verify with Architect.
- E. Toilet Seat Cover:
1. Model: Bradley 584.
  2. Quantity: Provide (1) at each toilet.
  3. Location: Verify with Architect.
- F. Soap Dispenser:
1. Model: Bradley 6562.
  2. Quantity: Provide (1) at each lavatory.
  3. Location: Install above lavatory.
- G. Mirrors:
1. Model: Bobrick B-290, 18" x 36".
  2. Quantity: Provide (1) at each lavatory.
  3. Location: See interior elevations.
- H. Hand Dryers:
1. Manufacturer: Saniflow
  2. Description: Speedflow, cast iron white enameled coating, surface mounted, 4" projection
  3. Model: M06AF-UL.
  4. Quantity: Provide (1) at each lavatory
  5. Location: See interior elevations.
  6. Electrical: verify voltage with electrical drawings
- I. Grab Bars:
1. Model: Bobrick B-490 Series
  2. Quantity and Configuration: As per drawings
  3. Location: As per drawings.
- J. Keys: Provide universal keys for internal access to accessories for servicing and resupplying.  
Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer.
- B. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- C. Secure mirrors to walls in concealed, tamper-resistant screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- D. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- E. Verify all dimensions shown on drawings by taking field measurements.
- F. Coordinate with all other trades whose work relates to the items specified herein for the placing of all required backing and furring to ensure proper anchorage and proper fit.
- G. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 13



SECTION 10 44 00 FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Fire Protection Specialties, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Provide fire extinguishers.
  - 2. Provide fire extinguisher cabinets.
  - 3. Provide fire blankets.
  - 4. Provide fire blanket cabinets.

1.02 REFERENCES

- A. CFC – California Fire Code, Section 906
- B. IFC - International Fire Code, Section 906
- C. Title 19, CCR – California Code of Regulations

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
- C. Submit Fire Extinguisher rating and classification.

1.04 QUALITY ASSURANCE

- A. Conform to CFC, IFC and Title 19 requirements for extinguishers.
- B. Fabricate and label fire extinguishers to comply with IFC Section 906.1, Standard for Portable Fire Extinguishers.
- C. Coordinate size of cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- D. Fire-Rated Cabinets: Listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall where it is installed.

1.05 ACCESSABILITY REQUIREMENTS

- A. Fire Extinguisher Cabinets must comply with CBC Sections 11B—307, 11B-308, 11B-309 and 11B-403.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Potter Roemer, Inc.
  - a. <http://www.potterroemer.com>
- B. Or equal as approved.

2.02 FIRE EXTINGUISHERS AND CABINETS

- A. Portable Fire Extinguishers: ABC Multi-Purpose Dry Chemical
  - 1. Potter Roemer 3005 ABC Dry Chemical.
    - a. Cylinder: Red polyester coated steel cylinder with pressure gage and nozzle.
    - b. Capacity: 5 lb.
    - c. Class: 2A:10B:C.
    - d. Ratings: UL rated and FM approved.
- B. Fire Extinguisher Cabinets
  - 1. Potter Roemer Alta 7008.
    - a. Size: 11-3/4" x 20-3/4" (frame o.d.).
    - b. Mounting Style: Semi-recessed.
    - c. Fire Rating: To match wall where installed.
    - d. Door Frame: Steel – cold rolled steel with recoatable polyester finish.
    - e. Color: As selected by Architect from Manufacturer's standard list.
    - f. Door Style: Duo Vertical Panel.
    - g. Lettering: None.
    - h. Glazing: 1/8" clear acrylic.
    - i. Door Hardware: Provide lever handle with cam-action latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.03 FIRE BLANKETS AND CABINETS

- A. Fire Blankets
  - 1. Potter Roemer Fire Blanket 6602.
    - a. Size: 60" x 90".
    - b. Material: Woven fire blanket treated with fire resistant chemicals.
- B. Fire Blanket Cabinets
  - 1. Potter Roemer Alta 7007.
    - a. Size: 11-3/4" x 20-3/4" (frame o.d.).
    - b. Mounting Style: Recessed.
    - c. Fire Rating: To match wall where installed.
    - d. Door Frame: Steel – cold rolled steel with recoatable polyester finish.
    - e. Color: As selected by Architect from Manufacturer's standard list.
    - f. Door Style: Solid Flush Panel.

- g. Lettering: Red die cut "FIRE BLANKET".
- h. Glazing: None.
- i. Door Hardware: Provide lever handle with cam-action latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

#### 3.02 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations indicated.
- C. Install cabinets plumb and level in wall openings to allow maximum 48 inches from finish floor to handle of fire extinguisher.

END OF SECTION 10 44 00

SECTION 10 82 00 ROOF SCREENS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Roof equipment screens and supporting steel framework.
- B. Roof screen accessories.

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 05 12 16 - Fabricated Fireproofed Steel Columns.
- C. Section 05 31 13 - Steel Floor Decking.
- D. Section 05 50 00 - Metal Fabrications.
- E. Section 07 22 16 - Roof Board Insulation.
- F. Section 07 50 00 - Membrane Roofing.
- G. Section 09 90 00 - Painting and Coating.
- H. Section 23 00 00 - Roof Top Mechanical Equipment.

1.03 REFERENCES

- A. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- D. ASTM A 1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- E. ASTM B 749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
- F. ASTM D 4811 - Specification for EPDM Sheet Used In Single-Ply Roof Membrane.
- G. ASTM D 6878 - Specification for Thermoplastic Polyolefin Based Sheet Roofing.
- H. ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

- A. Structural Performance:

1. Design to resist ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures.
2. Design all materials, assembly and attachments to resist snow, wind, suction and uplift loading at any point without damage or permanent set.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Shop Drawings: Layout and erection drawings showing typical cross sections and dimensioned locations of all frames and base supports. Include erection drawings, elevations, and details where applicable.
- D. Design Data: Structural design calculations, bearing seal and signature of professional engineer licensed to practice in the State in which the project is located. Include reactions at base supports for verification of roof structure.
- E. Selection Samples: For each panel product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each panel product selected, two sample chips representing actual color and finish.
- G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- H. Manufacturers warranties.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with a minimum five years documented experience in producing pre-manufactured metal-framed equipment screens.
- B. Installer Qualifications: Installer with a minimum five years documented experience in installing similar systems.
- C. Pre-Installation Meeting:
  1. Convene at job site, at least seven calendar days prior to scheduled beginning of construction activities of this section, to review requirements of this section.
  2. Require attendance by representatives of the roof screen installer, the roof and roof insulation installers, the mechanical equipment installers and other entities affected by construction activities of this section.
  3. Notify Architect seven calendar days in advance of scheduled meeting date.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  1. Finish areas designated by Architect.
  2. Construct mock-up of one frame with roof supports.
  3. Do not proceed with remaining work until workmanship and size is approved by Architect.

4. Accepted mock-up shall be comparison standard for remaining Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle and store materials in conformance with the manufacturers printed instructions.
- B. Store products undercover, in manufacturer's unopened packaging until ready for installation.
- C. Store materials in a dry, warm, ventilated weathertight location. Protect materials from exposure to moisture.
- D. Roof Placement: Spread the bundles and crates out to avoid overloading the roof structure. Place the material directly over major supports such as beams or trusses.

1.08 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.09 WARRANTY

- A. Manufacturer's Limited Warranty: 5 years covering complete framing system.
- B. Panel Coating Warranty: 20 years covering film integrity, chalk resistance, and color change.

1.10 COORDINATION

- A. Coordinate Work with other operations and installation of roofing materials to avoid damage to installed insulation and membrane materials.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: RoofScreen Mfg., which is located at: 347 Coral St. ; Santa Cruz, CA 95060; Toll Free Tel: 866-766-3727; Tel: 831-421-9230; Email: [request info \(info@roofscreen.com\)](mailto:info@roofscreen.com); Web: [www.roofscreen.com](http://www.roofscreen.com)
- B. Substitutions: Not permitted.

2.02 MATERIALS

- A. Base Supports: Fabricated from cold rolled steel conforming to ASTM A 1008 with internal deck fastening points. After fabrication, apply minimum 2-4 mil baked on powder coat primer.
  - 1. Height 12 inches (229 mm).
- B. Flashing Boot: Fabricated 45 mil, white, single ply PVC sheet. Provide with base flange that extends a minimum of 5 inches (127 mm) onto the roof surface on all four sides.
- C. Base Cap: Cold rolled steel conforming to ASTM A 1008. Fabricated to overlap base support and

flashing boot a minimum of 2 inches (51 mm). After fabrication finish as follows:

1. PVDF fluoropolymer, 1 mil, 2 coat, 70 percent.
- D. Base Cap Gasket: EPDM with self-adhesive closed cell foam.
- E. Framing: Carbon steel structural tubing with a 2.5 inch (64 mm) outside diameter conforming to ASTM A 500 with an Allied Tube "Gatorshield" triple layer galvanized coating. Provide with wall thickness as determined by structural calculations.
- F. Connector Fittings: Fabricated from cold rolled steel conforming to ASTM A 1008. After fabrication, apply zinc plating conforming to ASTM B 633 Type 1, then baked on powder coating minimum 2-4 mil Dupont Black T6IC Polyester #PFB603S9.
- G. Steel Hat Channel: Steel sheet conforming to ASTM A 653, Class SS, with a G90 hot-dip galvanized coating.
- H. Hardware: Bolts, nuts, washers and screws 18-8 stainless steel.
- I. Standard Panel:
1. Profile:
    - a. Flush Panel: 18" wide (17.75" net face size acceptable).
  2. Base Metal:
    - a. Minimum 18 gauge Galvalume steel sheet, AZ50, conforming to ASTM A 792 for painted and unpainted panels.
  3. Finish:
    - a. PVDF fluoropolymer, 1 mil, 2 coat, 70 percent.
    - b. Color as selected by Architect from manufacturer's standard color range.
    - c. Coat reverse side with white primer coat.
  4. Panel Fasteners: Concealed no. 14 self-tapping sheet metal screw.
  5. Panel Trim:
    - a. Material: Same as panel.
    - b. Finish: Same as panel.
    - c. Trim Cap: Standard.
    - d. Corner Trim: 3x3.
    - e. Edge Trim: Standard.
    - f. Configuration: As shown on Drawings.
- J. Gates:
1. Provide manufacture's gate kit.
    - a. Quantity, sizes, and locations as shown on Drawings.
    - b. Panel and Trim to match adjacent screen.

## 2.03 FABRICATION

- A. Fabricate, fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. 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.
- 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.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine installation area to verify the work can be performed in accordance with the Drawings and structural calculations without interferences from other equipment or trades.
- B. Do not begin installation until substrates have been properly prepared.
- C. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved drawings.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Provide for erection loads, and for sufficient temporary bracing to maintain indicated alignment until completion of erection and installation of permanent attachments.
- D. Anchor fabrications to structure as indicated.
- E. Separate dissimilar metals and use gasketed fasteners, isolation shim, or isolation tape to eliminate possibility of corrosive or electrolytic action between metals.
- F. Exercise care when installing components so as not to damage finish surfaces. Touch up as required to repair damaged finishes.
- G. Install flashing boots at base supports as required to provide a watertight connection. Install as recommended by the roofing materials manufacturer.
- H. Remove all protective masking from material immediately after installation.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 82 00



SECTION 11 52 13 PROJECTION SCREENS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with projection screens as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Manually-operated, roll-down front projection screens, ceiling recess-mounted.
  - 2. Electronic-operated, roll-down front projection screens, wall surface-mounted.
- C. Related Sections:
  - 1. Section 09 22 16 – Non Structural Metal Framing: Refer to details on drawings and manufacturer’s recommended details for projection screen support.
  - 2. Section 09 53 23 – Acoustical Ceiling Suspension Assemblies: T-bar ceiling grid and supports for projection screen ceiling mount; coordination of installation of ceiling trim kit and acoustical ceiling grid and panels.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer’s full product catalog.
- B. Shop Drawings: Submit shop drawings of anchorage details.
- C. Samples: Viewing surface, 6”x 6” minimum size.
- D. Operation and Maintenance Data: Submit for audio/visual equipment installed within building walls and ceilings, within casework and permanently attached to walls and ceilings.

1.03 QUALITY ASSURANCE

- A. Installer’s Qualifications: Installer shall have a minimum of three years full time experience performing work of similar scope and complexity to that specified. Where applicable, installer shall be certified or acceptable to manufacturer of equipment.
- B. Regulatory Requirements: Mounting and installation of audio/visual components shall comply with seismic restraint and anchoring requirements of California Building Code (CBC).
- C. Coordination: Coordinate recesses, backing and supports to suit audio/visual equipment. Provide access ways for installation, removal and servicing of built-in equipment.
- D. Gain Determination of Front Projection Screens per SMPTE RP 94-2000.

1.04 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with environmental requirements and recommendations of equipment manufacturers under which installation shall be performed, including temperature, humidity and dust.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Da-Lite Screen Company, Inc.
  - 1. <http://www.da-lite.com>
- B. Equivalent products of the manufacturers listed below will be acceptable.
  - 1. Draper, Inc.
    - a. <http://www.draperinc.com>
  - 2. or equal

### 2.02 MANUALLY-OPERATED SCREENS

- A. Classrooms and Laboratories
  - 1. Model: Da-Lite Model C with CSR.
  - 2. Size: 92" x 69" Seamless with black borders and black extra drop fabric.
  - 3. Aspect Ratio: 4:3 Video Format.
  - 4. Surface: Matte White (fire retardant and mildew resistant).
  - 5. Viewing Angle: 60 degrees.
  - 6. Gain: 1.0.
  - 7. Mounting: T-bar ceiling trim kit by screen manufacturer and as detailed on the drawings.
  - 8. Controls: Manual pull down with controlled screen return.
  - 9. Fire Rating: Screens shall be UL listed as fire retardant in accordance with all applicable codes, ordinances and standards, and shall be listed by the State Fire Marshal for use in schools.

### 2.03 ELECTRONIC-OPERATED SCREENS

- A. Lecture hall
  - 1. Model: Da-Lite Large Tensioned Cosmopolitan Electrol.
  - 2. Size: 168" x 126" Seamless with black borders and black extra drop fabric.
  - 3. Aspect Ratio: 4:3 Video Format.
  - 4. Surface: High Contrast Cinema Vision (fire retardant and mildew resistant).
  - 5. Viewing Angle: 50 degrees.
  - 6. Gain: 1.1.
  - 7. Mounting: Flush wall mounting per manufacturer and as detailed on the drawings.
  - 8. Controls: Decora style three position wall switch.
  - 9. Fire Rating: Screens shall be UL listed as fire retardant in accordance with all applicable codes, ordinances and standards, and shall be listed by the State Fire Marshal for use in schools.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings or instructed by the manufacturer.

- B. Verify that anchors and supports are accurately placed.

### 3.02 INSTALLATION

- A. Projection Screen Installation: Comply with manufacturer's instructions and recommendations.
- B. Ceiling Mounting: Provide supports above ceiling fabricated in compliance with requirements specified in Section 09 22 16 – Non Structural Metal Framing and coordinated with requirements specified in Section 09 53 23 – Acoustical Ceiling Suspension Assemblies.
  - 1. Independently support projection screen housing as detailed in drawings.
  - 2. Install trim kit per manufacturer and as detailed in drawings.
- C. Wall Mounting: Verify backing is in proper location as specified in Section 09 22 16 – Non Structural Metal Framing.
  - 1. Surface mount to wall per manufacturer and as detailed in drawings.

### 3.03 ADJUSTING, CLEANING, AND PROTECTING

- A. Adjusting: Make required adjustments for smooth operation, free of binding, squeaking and unnecessary rattling.
- B. Cleaning: Clean exposed components prior to substantial completion review.
- C. Protection: Protect projection screens from unauthorized use, marring and soiling.
  - 1. Deliver screens in manufacturer's undamaged, labeled packaging after building is enclosed and construction where screens will be installed is substantially complete.

END OF SECTION 11 52 13

SECTION 11 52 19 AUDIO-VISUAL EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with video components as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Video Projectors
  - 2. Video Projector Ceiling Mounts
  - 3. Flat Panel Monitors
  - 4. Flat Panel Monitor Wall Mounts
  - 5. Visualizers / Document Cameras
  - 6. Players and Recorders
  - 7. AV Control System
- C. Related Sections:
  - 1. Section 09 22 16 – Non Structural Metal Framing: Wall backing for monitor mounts.
  - 2. Section 09 53 00 – Acoustical Ceiling Suspension Assemblies: T-bar ceiling grid and supports for video projector ceiling mount; coordination of installation of projector mount and acoustical ceiling grid and panels.

1.02 REFERENCES

- A. Building Code: California Building Code (CBC), Chapter 16 – Structural Forces.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate wall mount locations, rough-in and anchor placement dimensions, tolerances and clearances required.
- B. Product Data: Provide dimensions and construction, platform load capacity and physical dimensions.
- C. Samples: Submit three samples of exposed finish surfaces, illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special installation requirements.

1.04 QUALITY ASSURANCE

- A. Seismic Anchorage Requirements: install equipment as detailed in drawings.
- B. Coordination: Coordinate projector mount installation with size, location and installation of projector screens specified in Section 11 52 13 – Projection Screens.

PART 2 - PRODUCTS

2.02 ACCEPTABLE MANUFACTURERS

- A. Video Projectors and Flat Panel Monitors
  - 1. NEC Display Solutions
    - a. <http://www.necdisplay.com>
- B. Video Projector Ceiling Mounts and Flat Panel Monitor Wall Mounts
  - 1. Peerless Industries, Inc.
    - a. <http://www.peerlessindustries.com>
- C. Visualizers / Document Cameras
  - 1. WolfVision
    - a. <http://www.wolfvision.com>
- D. Players and Recorders
  - 1. Panasonic
    - a. <http://www.panasonic.com>
- E. AV Control System
  - 1. Crestron Electronics, Inc.
    - a. <http://www.crestron.com>

## 2.03 VIDEO PROJECTORS

- A. Classrooms
  - 1. Projector: NEC NP3250W.
  - 2. Lens: Standard.
  - 3. Projection Type: 0.74" 3-LCD with MLA.
  - 4. Brightness: 4000 ANSI lumens.
  - 5. Native Resolution: 1280 x 800 pixels.
  - 6. Aspect Ratio: 16:10.
  - 7. Network: Integrated RJ45 connection.

## 2.04 VIDEO PROJECTOR CEILING MOUNTS

- A. Suspended T-bar Ceiling
  - 1. Projector Mount: Peerless PJF2-UNV.
  - 2. Column Connector: Peerless ACC850.
  - 3. Adjustable Column (verify with mounting location).
    - a. Classrooms: Peerless ADJ006009.
  - 4. Ceiling Tray: Peerless CMJ450.

2.05 FLAT PANEL MONITORS

A. NEC MultiSync LCD4620-2-AV

1. Display Type: LCD.
2. Image Size: 46".
3. Brightness: 700 cd/m<sup>2</sup>.
4. Native Resolution: 1366 x 768 pixels.
5. Aspect Ratio: 16:9.

2.06 FLAT PANEL MONITOR WALL MOUNTS

A. Peerless PLA60-UNL-S

1. Articulating wall arm with universal adapter plate.

2.07 VISUALIZERS / DOCUMENT CAMERAS

A. Ceiling Mounted – Classrooms

1. Visualizer: WolfVision EYE-12.
2. Camera: 1-CCD 1/3" progressive scan.
3. Frame Rate: 30 frames per second.
4. Native Resolution: 1280 x 960 and 1280 x 720.
5. Lens: 12x optical zoom + 4x digital zoom.
6. Focus: Continuous high speed autofocus and manual focus.
7. Lens Tilt Range: None.
8. Light: None.
9. Ethernet/LAN: 10/100 Mbps with PoE.
10. Controls: To be hardwired to audio-video control system.
11. Accessories: Ceiling tile bridge and white trim ring.

B. Desktop Portable

1. None This Project.

2.08 PLAYERS AND RECORDERS

A. Blu-Ray Player

1. Player: Panasonic DMP-BDT110.
2. Video Converter: 148.5MHz/12bit.
3. Audio Converter: 192kHz/24bit.
4. Inputs: SD memory card slot, USB, Ethernet for network.
5. Controls: To be hardwired to audio-video control system.

2.09 AUDIO-VISUAL CONTROL SYSTEM

A. Classrooms

1. AV Controller: Crestron MPS-250 Media Manager.
2. User Interface: Crestron C2N-FT-TPS4 FlipTop Touchpanel Control Center.
  - a. Color: Black anodized aluminum.

3. CAT6-to-RGB: Crestron QM-RX QuickMedia Receiver.
4. Speakers: JBL Control Contractor 26CT.
  - a. Low Freq.: 6-1/2" woofer.
  - b. High Freq.: 3/4" titanium-coated tweeter.
  - c. Transformer: 70V.
  - d. Accessories: Provide white grille and backbox.
  - e. Quantity: Provide (2) per room.
5. Audio Amplifier: Built into av controller.
6. UPS: Crestron CEN-UPS1250.
  - a. Quantity: Provide (29).
7. Locations:
  - a. Controller: Shelf mounted inside Lectern.
  - b. Interface: Top of Lectern per plan.
  - c. Speakers: Ceiling mounted per plan, flush in acoustic tile.

B. Management Software

1. Crestron RoomView Server Edition (SW-ROOMVW-SERVER).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings or instructed by the manufacturer.
- B. Verify rough-in conditions.
- C. Verify that anchors and supports are accurately placed.

3.02 INSTALLATION

- A. Installation, General: Install audio-visual mounting assemblies in compliance with manufacturer's instructions and requirements of listing authorities.
  1. Anchor equipment securely in place. Conform to California Building Code (CBC), Table 16-0, for horizontal force factor.
  2. Touch-up minor damaged surfaces caused during installation. Replace damaged components.
- B. Video Projector Ceiling Mounts
  1. Install per manufacturer's instructions and recommendations and as detailed in drawings.
  2. Coordinate installation of ceiling panel with t-bar ceiling grid specified in Section 09 53 00 – Acoustical Ceiling Suspension Assemblies.
  3. Completed assembly shall be ready for installation of wiring.
- C. Flat Panel Monitor Wall Mounts
  1. Install per manufacturer's instructions and recommendations.
  2. Coordinate installation location of mount with wall backing.

3. Completed assembly shall be ready for installation of wiring.

3.03 ADJUSTING AND CLEANING

- A. Adjusting: Adjust operating elements for proper alignments and operation.
- B. Cleaning: Clean components to dust-free condition for substantial completion review.

END OF SECTION 11 52 19



SECTION 12 21 23 ROLL-UP WINDOW BLINDS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Roll-up Window Blinds, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Manually operated, surface mounted window shades.

1.02 SUBMITTALS

- A. Submit shop drawings for shade system. Show materials, finish, characteristics, construction, and fabrication details and procedures, methods of anchorage to building construction, templates for backing or anchorage, and other criteria. Submit dimensioned rough-in drawings showing location of all components.
- B. Submit Product Data: Manufacturer's catalog, rough-in diagrams, and installation requirements.
- C. Submit sample of shade material and mechanism housing finish.
- D. Installation Instructions: Provide complete installation instructions for each type unit.

1.03 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original packaging. Identify contents, manufacturer, brand name and applicable standards.
- B. Store and handle in manner to prevent damage and marring of finish. Protect finished surfaces from damage. Store units on pallets or other approved devices. Store materials inside building, under protective covering, and protect from weather, moisture, open flames and sparks.

1.04 WARRANTY

- A. Provide written warranty covering materials and workmanship of work of this section for a period of two years, and repair or replace material which becomes defective during warranty period. Continued use of defective equipment shall be available until replacement equipment is delivered.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Use only products of one manufacturer for each item unless otherwise noted or specified. Acceptable manufacturers are:
  - 1. MechoShade Systems, Inc., Los Angeles, California (323) 223-3223.
  - 2. Draper Inc., Spiceland, Indiana (765) 987-7999

2.02 WINDOW SHADE SCREENS, MANUALLY OPERATED

A. Acceptable Products

1. MechoShade manual chain-driven roller shade screen with Mecho SlimLine Bracket.
2. Draper FlexShade manual chain-driven roller shade screen with small headbox and fascia.

B. Shade fabric shall be a woven vinyl/polyester cloth with antimicrobial properties and flame retardant. Shade percentage and color of fabric will be chosen from manufacturer standard fabrics.

PART 3 - EXECUTION

3.01 GENERAL

- A. Location: All exterior windows receive window blinds with the exception of windows located in the Vestibules. Vestibule Windows 1.1, 1.2, 1.7, 1.8, 3.1, 3.2, 3.7 and 3.8 do not receive window blinds.

3.02 INSTALLATION

- A. Conform to approved submittals and manufacturers directions.
- B. Install by manufacturers recommendations.
- C. Install shades level to operate smoothly without binding and in perfect alignment at all times when in motion.

END OF SECTION 12 21 23

SECTION 12 32 16 PLASTIC LAMINATE – CLAD CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Plastic Laminate – Clad Casework, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Provide base cabinet units.
  - 2. Provide upper cabinet units.
  - 3. Provide wall units.
  - 4. Provide countertops.
- C. Related Sections
  - 1. Section 06 40 23 Interior Architectural Woodwork

1.02 REFERENCES

- A. NEMA LD-3 High Pressure Decorative Laminates
- B. PS 1 – Construction and Industrial Plywood
- C. PS 20 – American Softwood Lumber Standard
- D. PS 51 Hardwood and Decorative Plywood
- E. WI – Woodwork Institute
- F. AWS – Architectural Woodwork Standard
- G. Chapter 16A, California Building Code
- H. ANSI A208.1 Wood Particle Board
- I. AQMD – Local Air Quality Management District Regulations

1.03 ACCESSIBILITY REQUIREMENTS

- A. Operable parts all accessible casework shall comply with CBC Section 11B-309.

1.04 DEFINITIONS

- A. MDF: Medium Density Fiberboard
- B. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48” above floor, and surfaces visible in open cabinets

- C. Semi-exposed Portions of Cabinets: Surfaces behind solid doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cases 78 inches or more above floor are defined as semi-exposed.
- D. Concealed Portions of Cabinets: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets.
- E. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.

#### 1.05 SUBMITTALS

- A. Submit as per Section 01 33 00, Submittal Procedures.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
    - a. Include statement indicating costs for each product having recycled content.
  - 2. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used to produce cabinets and countertops complies with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
    - b. Include statement indicating costs for each certified wood product.
  - 3. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
- C. Submit Shop drawings showing location of each item, dimensioned plans and elevations and large-scale details.
- D. Shop drawings shall include materials, components profiles, fastening methods, assembly methods, joint details, accessory listings and schedule of finishes.
- E. Product Data:
  - 1. For each type of product indicated.
  - 2. All hardware.
- F. Submit a complete line of plastic laminate chips, in wood grains and solid colors, identified with manufacturer's name and chip number.
- G. Submit 6 inch sample of PVC edge banding.
- H. Cabinet Samples:
  - 1. Provide full size base cabinet with countertop and upper cabinet of each casework type indicated, in specified finish with hardware installed. Include pair of doors and at least one drawer.
  - 2. Approved sample unit may be used as part of the Work.

1.06 QUALITY ASSURANCE

- A. Cabinets and countertops shall be manufactured in accordance with the latest edition of the Architectural Woodworks Standards ( AWS ) for Grade specified herein or to higher standards as specified herein or shown on drawings.
- B. Before delivery to the jobsite, the casework supplier shall submit a Woodwork Institute ( WI ) Certified Compliance Certificate indicating the products he will furnish for this project, and certifying that they will fully meet all the requirements of the Grade specified.
- C. Confirmation of all WI inspections shall be submitted.
- D. All WI cost shall be included.
- E. All Casework construction shall comply with the structural requirements of Table 16A-O, California Building Code for required horizontal force factor for anchorage of non-structural items.
- F. Forest Certification: Fabricate cabinets and countertops with wood and wood-based products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- G. Coordination: Coordinate layout and installation of framing and reinforcements in walls and partitions for support of manufactured wood casework

1.07 DELIVERY, STORAGE AND HANDLING

- A. Conform to Section 26, WIC Manuel of Millwork and WIC Technical.
- B. Deliver manufactured wood casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet are equal to conditions that will be maintained when building is occupied.
- C. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install manufactured wood casework until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with manufactured wood casework by field measurements before fabrication.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manufactured wood casework that fails in material or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Delamination of components or other failures of glue bond.

- b. Warping of components.
  - c. Failure of operating hardware.
  - d. Deterioration of finishes.
2. Warranty Period: Five years from date of substantial completion.

## PART 2 - PRODUCTS

### 2.01 GENERAL

#### A. Grade:

1. Laboratory Grade in accordance with WIC Manual of Millwork, Section 15.
2. Grade Rules Modifications:
  - a. Interior surfaces of open cabinets shall be Premium Grade.
  - b. Interior surfaces of hinged doors shall be Premium Grade.

### 2.02 MATERIALS, GENERAL

#### A. Plastic Laminate: High pressure decorative laminate complying with NEMA LD-3.

1. Cabinet Surfaces:
  - a. Vertical surfaces: Decorative high pressure laminate, general purpose type, .028 inch thick
  - b. Horizontal surfaces: Decorative high pressure laminate, .050 inches thick
  - c. Post formed: Decorative high pressure laminate, .042 inch thick
2. Countertops:
  - a. Horizontal surfaces: Decorative high pressure laminate, .050 inches thick
  - b. Post formed: Decorative high pressure laminate, .042 inch thick
3. Countertops ( Chemical and Stain Resistant ): Provide in Office 1.15
  - a. Horizontal surfaces: Decorative high pressure laminate, .050 inches thick
  - b. Post formed: Decorative high pressure laminate, .042 inch thick
4. Laminate Backing Sheet: NEMA LD-3 BKS/-91 Backing grade, undercoated plastic laminate, with face material of .028 inches or BKS/-92 with face material of .042 or .050 inches.
5. Laminate Manufacturers: Products of the following manufacturer or supplier form the basis for design and quality intended.
  - a. Formica Corporation.
  - b. Ralph Wilson Plastics Co.
  - c. Nevamar Corporation.

#### B. Thermoset Decorative Panel: Particle Board or MDF finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

#### C. Wood Materials: Mahogany or other close grain hardwood

D. Sheet Materials:

1. Wood Particleboard: Industrial Grade, ANSI A208.1, Table I, Grade 1-M-2, composed of wood chips, medium density made with water-resistant binder.
2. MDF: ANSI A208.2, Grade 130.
- A. Hardwood Plywood PS 51; rotary cut Philippine mahogany, or other close-grain hardwood. All plywood shall be laminated on both sides for a balanced panel.

B. Edgbanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish.

1. 3 mm thick at doors and drawer fronts and face of casework.
2. 1 mm thick elsewhere.

C. Edgbanding for Thermoset Decorative Panels: PVC or polyester edge banding complying with LMA EDG-1 and matching thermoset decorative panels.

D. Low-Emitting Materials: Provide manufactured wood casework, including countertops, made with adhesives and composite wood products containing no urea formaldehyde.

2.03 CABINET MATERIALS

A. Exposed Cabinet Materials:

1. Plastic Laminate: NEMA Grade VGS.
2. Provide specified edgbanding on all exposed edges.

B. Semi-exposed Cabinet Materials:

1. Thermoset Decorative Panels: Provide thermoset decorative panels for semi-exposed surfaces unless otherwise indicated.
2. Plastic Laminate at interior surfaces of open cabinets
3. Plastic Laminate at interior surface of hinged doors

C. Concealed Cabinet Materials:

1. Plastic Laminate: Grade BKL.

2.04 DESIGN, COLOR, AND FINISH

A. Design: Provide manufactured wood casework of the following design:

1. Construction Style: Style A frameless
2. Construction Type: Type I, multiple self-supporting units rigidly joined together.
3. Door and Drawer Front Style: Flush overlay with wire pulls.

B. Thermoset Decorative Panel Colors, Patterns, and Finishes: As selected by Architect from casework manufacturer's full range.

C. Plastic-Laminate Colors, Patterns, and Finishes: As selected by Architect from plastic-laminate manufacturer's full range.

D. PVC Edgbanding Color: As selected from casework manufacturer's full range.

2.05 COUNTERTOPS

- A. Countertops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Provide front and end overhand of 1 inch over base cabinets.
- B. Plastic-Laminate Tops: Plastic-laminate sheet, shop bonded to both sides of 1-1/8-inch plywood or particleboard. Sand surfaces to which plastic laminate is to be bonded.
  - 1. Plastic Laminate for Flat Tops: NEMA Grade HGS.
  - 2. Plastic Laminate for Backing: NEMA Grade BKL.

## 2.06 DRAWERS

- A. Drawer Manufacturers: Products of the following manufacturer or supplier form the basis for design and quality intended.
  - 1. DBS Drawer Box Specialties, (800) 422 9881.
- B. Drawer Specifications:
  - 1. Material: Prefinished Hardwood Maple Plywood
  - 2. Sides: 15 mm", Prefinished Hardwood Maple Plywood, 11 ply
  - 3. Bottom: 1/2", Prefinished Hardwood Maple Plywood, 9 ply
  - 4. Bottom detail: DBS Option A.
  - 5. Corner detail: Dovetail
  - 6. Top edge detail: Bullnose, pre-finished plywood
  - 7. Face: 3/4" plastic laminate anchored to drawer box

## 2.07 CABINET HARDWARE

- A. Drawer Slides: Minimum 100 lb capacity for all drawers. Full extension ball bearing type only. ACCURIDE A3832 or equal.
- B. File Drawer Slides: Minimum 150 lb capacity for all drawers. Full extension ball bearing type only. ACCURIDE A417 or equal.
- C. Hinges: Heavy duty wrap around, non-removal type pin butts, ROCKFORD 851. Minimum of 2 hinges on doors under 42 inches in height, minimum of 3 hinges on doors over 42 inches in height.
- D. Shelf Seismic Restraint Clip: Hettich #1005082, Provide at all open shelves.
- E. Magnetic Cathes: EPCO 592. Provide at all cabinet doors.
- F. Elbow Catches: EPCO 1018 Stainless Steel. Provide at inactive cabinet door leaf.
- G. Pulls: Builders No. 9054, 4 inch center to center, stainless steel, U shaped wire pull.
- H. Door Locks: Minimum 5 pin tumbler, OLYMPUS-700SC Schlage keyway, integrated with key system specified in Section 08 71 00 Door Hardware
- I. Drawers Locks: Minimum 5 pin tumbler, OLYMPUS-800SC Schlage keyway, integrated with key system specified in Section 08 71 00 Door Hardware
- J. Keying for Door and Drawer Locks: Each room keyed differently, all locks keyed to master key, integrated with key system specified in Section 08 71 00 Door Hardware
- K. Padlockable Cam Lock: OLYMPUS DCP with DCNP-500-ARP Anti-rotation plate.



2.08 GLAZING IN DOORS

- A. Clear, Tempered Float Glass for Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q3; manufactured by horizontal (roller hearth) process, with exposed edges seamed before tempering, ¼ inch thick.

2.09 CABINET FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Apply plastic laminate in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline.
- C. Countertop Backsplash: Coved
- D. Countertop Edge: Rolled, no drip bullnose where sink occurs
- E. Plastic Laminate Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
  - 1. Semi-Exposed Surfaces: Low pressure decorative melamine overlay, except as specified herein.
    - a. Provide high pressure laminate to all visible surfaces from a seated or standing position, including interior surfaces of open casework, shelving and surfaces behind glass doors.
    - b. Provide high pressure laminate to interior surfaces of hinged doors.
  - 2. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: ¾-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semi-exposed surfaces.
  - 3. Shelves: Thermoset decorative panels.
    - a. ¾ inch thick for shelves less than 32 inches in length
    - b. 1 inch thick for shelves over 32 inches in length
  - 4. Backs of Cabinets: ½-inch particleboard, plastic-laminate faced [on exposed surfaces, thermoset decorative panels on semi-exposed surfaces].
  - 5. Drawer Fronts: ¾-inch particleboard, plastic-laminate faced.
  - 6. Doors: ¾-inch particleboard or MDF with wood stiles and rails, plastic-laminate faced.
- F. Drawer lock anchor: Provide ¾" x 4" backer for cam of padlockable cam lock
- G. TOEKICK: Provide ¾" Hardwood Plywood, 9 ply, detached.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify adequacy of backing and support framing.

3.02 EXAMINATION

- A. Examine areas, with installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of manufactured wood casework.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.03 INSTALLATION, GENERAL

- C. Set and secure casework in strict accordance with Section 26, WIC Manual of Millwork.
- D. Casework shall be anchored to wall or floors to conform to the minimum requirements of Section 1613A and 1614A, California Building Code.

### 3.04 CASEWORK INSTALLATION

- A. Install level, plumb, and true; shim as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16-inch of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
  - 1. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 16 inches o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than two fasteners.
- C. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, or framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch.
  - 1. Fasten through back, near top and bottom, at ends, and not more than 16 inches o.c.
  - 2. Use toggle bolts at hollow masonry.
  - 3. Use expansion anchors at solid masonry.
  - 4. Use No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish at metal-framed partitions.
  - 5. Use toggle bolts at plaster on metal lath.
- D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- E. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

### 3.05 INSTALLATION OF TOPS

- A. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so project-site processing of top and edge surfaces is not required. Locate field joints where shown on shop drawings.
  - 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten

according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

- B. Secure tops to cabinets with Z-or L-type fasteners or equivalent, using two or more fasteners at each front, end, and back.
- C. About top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- D. Secure backsplashes and end splashes to walls with adhesives.
- E. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

### 3.06 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48-inches o.c. Remove protection at substantial completion.

END OF SECTION 12 32 16

SECTION 12 93 00 SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Site Furnishings, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Trash receptacles.
  - 2. Tree grates.
  - 3. Provide precast concrete sphere bollards.

1.02 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit product data.
- C. Submit samples illustrating materials and finish, color and texture of each type of site furnishing.
- D. Submit manufacturer's installation instruction

1.03 DELIVERY, STORAGE AND HANDLING

- A. Wrap or otherwise package assemblies for protection against damage and staining. Store materials at project site in clean covered area.

1.04 WARRANTY

- A. Provide five year warranty.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Products of the following manufacturer or supplier form the basis for design and quality intended.
  - 1. Fair Weather Site Furnishings & Accessories  
1525 Vivian Court  
Port Orchard, WA 98367  
(800) 323-1798  
[www.fairweathersf.com](http://www.fairweathersf.com)
  - 2. Wausau Tile, Inc.  
Banning, CA 92220  
(909) 849-5695
- B. Tree Grates

1. Manufacturer: Fairweather Site Furnishings.
2. Model: STA Series, STA72
3. Size: 72"
4. Sections: 2
5. Hole Diameter: 16"
6. Weight: 466 lbs.
7. Quantity: as per drawings

C. Trash Receptacles

8. Manufacturer: Wausau Tile.
9. Model: TF1099, Precast Concrete
10. Model: TF1099, with recycle logo and blue hinged dome top for recyclable materials
11. Option: Hinged Dome Top
12. Quantity: Total of sixteen (16), Eight (8) standard, Eight (8) with recyclable logo

D. Precast Concrete Sphere Bollard

1. Manufacturer: Wausau Tile.
2. Model: TF6100, SB30 Sphere Bollard.
3. Finish: Light Sandblast
4. Quantity: Eleven ( 11 )

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that surfaces are ready to receive work.
- B. Field verify all dimensions.
- C. Beginning of installation means acceptance of substrate conditions.

3.02 INSTALLATION

- A. Install furnishings in accordance with manufacture's instructions.
- B. Location:
  1. Tree grates: As per drawings.
  2. Trash receptacles: As directed by Architect.
  3. Precast concrete sphere bollards: As per drawings

3.03 CLEANING

- A. Clean furnishings in accordance with manufacturer's instructions.

END OF SECTION 12 93 00

SECTION 22 00 00 PLUMBING

PART 1 – GENERAL

1.01 SUMMARY

- A. The drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, shall govern the work in this section the same as though written herein in full. It is the intent to provide a complete, tested, and operating plumbing system.
- B. Scope of Work: The work to be done under this heading shall include furnishing all labor, materials, fixtures and services together with the demolition, installation, testing and adjusting necessary to the acceptable completion of all the plumbing work shown on the drawings or as herein specified.
- C. Description Of Work
  - 1. The following list is intended to generally describe the various plumbing systems to be installed, but shall not be considered as a limit of the work to be performed under this section of the specifications:
    - a. Connection to site water, sewer, gas piping systems as shown including sawcutting and haul-away.
    - b. Sanitary soil, waste and vent systems.
    - c. Rainwater drainage systems.
    - d. Domestic hot and cold water systems, including new water service to building.
    - e. Natural Gas piping systems including new gas service to building.
    - f. Rough in and final connections to owner furnished equipment.
    - g. Air conditioning condensate drain systems.
    - h. Plumbing fixtures and equipment.
    - i. Rough-in and final connections for all fixtures and equipment.
    - j. Insulation.
    - k. Remote chillers for drinking fountains
    - l. Sterilization and tests of domestic water systems.
    - m. Roof sanitary vents and flashing for the same.
    - n. Trenching and Backfill per Section 31 23 33.
- D. Related Work not in this Section
  - 1. The following work will not be furnished under this section of the Specifications, but will be included in other specification sections:
    - a. All line voltage wiring (regardless of voltage ) and all miscellaneous wiring devices and all connections thereto and all line and low voltage conduit. All electrical disconnects and starters not integral to equipment scheduled and / or specified. All timeclocks and miscellaneous “on-off” control devices.
    - b. Final painting.
    - c. Toilet room accessories.
    - d. Fire protection system.
    - e. Joint sealants.
    - f. Landscape irrigation and drainage systems

1.02 SUBMITTALS

- A. The Plumbing Contractor shall provide submittal data for all fixtures and material being furnished by him to the Architect for approval. Submit the following according to the Conditions of the Contract and Division 1 Specifications Sections: 01 33 00.
1. Product data for:
    - a. Plumbing fixtures including floor drains, floor sinks
    - b. Laboratory Fixtures
    - c. Laboratory Equipment
    - d. Water heaters
    - e. Pumps
    - f. Remote chillers for drinking fountains
    - g. Pipe, fittings, valves, specialties
    - h. Insulation
  2. Pipe penetrations:
    - a. Fire proofing material and sleeves
- B. Each submittal brochure shall contain all of the items listed above and shall be bound with covers, indexed with tabs and have a table of contents. Submittals shall indicate make, specific model and size, accessories, dimensional drawings, diagrams and other pertinent information. Submit all items at one time. Partial submittals are not acceptable. Substitutions of materials and fixtures from that specified herein, noted on the drawings or as outlined in the General or Supplementary Conditions shall be clearly identified as substitutes. Deviation data to clearly demonstrate equivalency and comparisons between specified items and proposed substitutions shall be provided by the Plumbing Contractor unless prior arrangements are made to compensate the Architect for researching this data. "Equivalent" submittals lacking this information will be returned "not reviewed". Approval of substitutions shall in no way relieve the Plumbing Contractor from the responsibility of complying with the plans and specifications and installation in the space available.
- C. The following submittals for closing out the job shall be a prerequisite to the issuance of Final Certificate of Payment.
1. Certificates of water quality
  2. Reproducible "As-built" (record) drawings
  3. Approved inspection reports
  4. Guarantee

### 1.03 QUALITY ASSURANCE

- A. Work of the contract shall satisfy the requirements of:
1. IAPMO, ASME, ANSI, ASTM, CISPI standards for base materials.
  2. N.F.P.A.- 13
  3. American Gas Association (A.G.A.)
  4. 2016 California Building Code (CBC) Title 24, Part 2, CCR
  5. 2016 California Electric Code (CEC) Title 24, Part 3, CCR
  6. 2016 California Mechanical Code (CMC) Title 24, Part 4, CCR
  7. 2016 California Plumbing Code (CPC) Title 24, Part 5, CCR
  8. SMACNA Seismic Restraint Manual, latest edition.
- B. All brazers and welders shall be qualified with the brazing and welding procedures set forth in ASME Boiler and Pressure Vessel Code – current edition. If the work of any welder or brazer creates a reasonable doubt as to his skill, the Architect/Engineer may require the welder to be requalified.

- C. Provide manufacturer's certificate that materials and fixtures meet or exceed minimum requirements as specified.
- D. Where these drawings and specifications call for or describe materials or construction of a better quality or larger sizes than required by all laws, codes ordinances, regulations and orders of any public authority bearing on the performance of the work, the drawings and specifications shall take precedence.
- E. Testing and Inspections: Contractor shall arrange for inspections required by authority having jurisdiction and deliver any certificates of such inspections to the Owner. Owner shall pay for all inspections required.
- F. Permits: Owner shall apply and pay for all permits required by any public authority having jurisdiction.

1.04 PRODUCT AND FIXTURE DELIVERY, STORAGE AND HANDLING

- A. Exercise care in transporting and handling to avoid damage to and contamination of materials and fixtures.
- B. Materials and fixtures kept at the job site shall be stored in enclosures or under protective covering. Material and fixtures shall be stored above grade in manufacturer's original, unopened protective packaging and kept as clean and dry as possible.
- C. Damage to materials and/or fixtures due to negligence in handling, storage or delivery shall be cause to reject and replace all such damaged material and/or fixtures at the Contractor's own expense with no additional cost to the Project.

1.05 PROJECT CONDITIONS, SUPERVISION AND WORKMANSHIP

- A. The Plumbing Contractor shall examine the complete project drawings and make a preliminary examination of the site. The Plumbing Contractor shall also examine in advance methods for installation, means to be provided for getting fixtures and equipment into place, routing of piping and any other requirements of the work. This shall include verification that all systems and all fixtures will fit spaces allotted. Work shall be installed so that indicated ceiling heights are maintained, with no portion of the work requiring excessive furring.
- B. The Plumbing Contractor must consider and include any additional cost involved in verifying and coordinating the work with existing conditions and points of connection. If situations arise where the work cannot be installed as intended, the Owner's representative must be informed to assist in resolving the problem.
- C. Fixtures shall be located within rooms as indicated on Architectural and Plumbing drawings. In the event these drawings do not indicate locations by exact dimension, such locations shall be obtained from the Architect prior to installation. Should the Plumbing Contractor elect to install such fixtures without prior instruction, he shall be subject to removal and reinstallation of such fixtures at the discretion of the Architect without additional cost to the project.
- D. The Plumbing Contractor shall provide all the rigging, scaffolding, tools, tackle, hoist, personnel safety equipment, labor, etc., necessary to complete the installation of fixtures and materials in accordance with the intent of this specification.
- E. The Plumbing Contractor must coordinate all areas of the work required with the Owner's Representative as they relate to material, storage, trash removal, hours of work, job site office,



telephone, sanitary facilities, electrical power, drinking water, hoisting, temporary barriers, safety measures, etc., including cost of such items.

- F. The Plumbing Contractor is responsible to coordinate demolition and reconstruction (cutting and patching) of walls, floors, and ceilings required for the performance of the work of this Section of the Contract. Other appropriate Contractor is responsible for the actual demolition and reconstruction of walls, floors and ceilings. The Plumbing Contractor is responsible for demolition and reconstruction of existing hardscape as required for performance of work under this Section of the Contract.
- G. The Plumbing Contractor shall have a competent Job Superintendent and/or Foreman on site or available at all times by phone (“pager”) during project progress with authority to act on the Contractor’s behalf and to supervise the installation of the work under this section. Superintendent shall also be responsible in conferring with other trades as to the proper execution and conduct of the work under this section so that work may be carried on as rapidly as possible and still maintain coordination with the other trades in progress at the same time.
- H. All workmanship shall be first class in every respect and shall be performed only by skilled mechanics recognized as such in each of their respective trades.

#### 1.06 DRAWINGS AND SPECIFICATIONS

- A. Drawing and specifications are intended to complement each other and are required to be taken together to provide all associated items of work, materials and equipment necessary for a complete installation.
- B. A set of plumbing drawings will accompany these specifications showing the arrangements and sizes of piping systems and principal connections to the plumbing fixtures. Drawings and specifications are intended to complement each other to the extent that all associated items of work and materials necessary to the completion of the installation of the systems shall be provided whether or not mentioned in the specifications or shown on the drawings.
- C. Discrepancies between Architectural and Plumbing drawings: the drawings showing the greater number of fixtures shall govern. Where fixtures are indicated on the Architectural plan, but not similarly shown on the Plumbing drawings and where such items are covered by specifications, all such items together with the necessary appurtenances and services shall be provided. Discrepancies as described above are inadvertent and it shall be the Plumbing Contractor’s responsibility to comply with the intent of this paragraph and the Contract.
- D. Plumbing work, as laid out, is to some extent, diagrammatic and locations thereon are drawn to scale where possible. It is not the intention of the drawings to show all the offsets, fittings, and accessories. Locations indicated shall be adhered to as closely as possible; reasonable deviations therefrom shall be made at no additional expense.

#### 1.07 AS-BUILT DRAWINGS

- A. On a set of contract drawings kept at the site during construction, the Plumbing Contractor shall mark all work as it is completed with sufficient dimensions including depths of below floor or finish grade to locate all work installed. Mark all work inside, outside and beneath the building.
- B. The marked drawing shall be kept current as the work progresses and shall be available for inspection upon request. At the close of construction The Plumbing Contractor shall transfer all markings to a set of reproducibles and deliver these drawings to the Architect.
- C. The correct and completed “As-Built” drawings are a pre-requisite to final contract payment in conformance with Paragraph 1.6.C.

1.08 GUARANTEE

- A. All work shall be guaranteed for a minimum period of one year from either the official date of completion or from the official date of acceptance by the Owner whichever is the later date.
- B. Certain items shall be guaranteed for a longer period, as stated in the specification for those items.
- C. Should any trouble develop during this time due to defective material, faulty workmanship, or non-compliance with plans, specifications, codes, or written directions of the Owner, Architect, or Inspector the Plumbing Contractor shall furnish all necessary labor and materials to correct the trouble without additional charges.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All materials shall be new, of commercial quality, and shall be standard current products of manufacturers regularly engaged in the production of plumbing products. Unless indicated otherwise, all fixtures, and equipment shall conform to the same requirements as “materials”. Use the same brand of manufacture for each class of fixtures, equipment, or material.

2.02 PIPING SYSTEMS MATERIALS

- A. Soil, Waste and Vent Systems (above grade): ASTM A-74 cast iron soil pipe with “No-hub” fittings and joints. Alternate: Use DWV copper with solder joints for vertical vent piping. Alternate: Use DWV copper with solder joints for above grade waste in congested areas as required.
- B. Soil, Waste and Vent Systems (interior, below grade): ASTM D2751 ABS pipe and solvent cement fittings.
- C. Soil, Waste (exterior, below grade ): ASTM D2751 ABS pipe and solvent cement fittings.
- D. Rainwater Piping Systems: ASTM-74 cast iron soil pipe with “no-hub” fittings and joints at concealed areas. Schedule 40 galvanized steel pipe at exposed areas.
- E. Domestic Water Systems (above grade and connections to existing below grade): ASTM B-88 Type L hard drawn copper tubing with wrought copper solder fittings. Solder with 95-5 tin-antimony or approved lead free solder.
- F. Domestic Water System (exterior, below grade): Schedule 40 PVC Pipe with solvent cement fittings.
- G. Domestic Water Systems (interior, below floor): ASTM B-88 Type L soft copper tubing with no joints below slab. Solder above grade connections to hard drawn tubing with 95-5 tin-antimony or approved lead free solder.
- H. Air Conditioning Condensate Systems: ASTM B-88 Type M (insulated) hard drawn copper tubing with wrought or cast solder fittings. Solder with Harris “Stay-Safe 50”, or equivalent lead-free solder.
- I. Indirect Drains: Type DWV copper tubing and fittings or Type M hard drawn copper tubing with wrought or cast solder fittings. Solder with Harris “Stay-Safe 50”, or equivalent lead-free solder. Insulate refrigerated drains.

- J. Fuel Gas Systems (exterior, above grade): ASTM A-53, Schedule 40 galvanized steel pipe with malleable 150 lb. screwed fittings for up through 2" and butt welding fittings for 2-1/2" and larger.
- K. Fuel Gas Systems (interior, above grade): ASTM A-53, Schedule 40 steel pipe with malleable 150 lb. screwed fittings for up through 2" and butt welding fittings for 2-1/2" and larger.
- L. Fuel Gas Systems (exterior, below grade): SDR II polyethylene (PE) pipe with manufacturer's recommended heat fusion fittings, approved PE-to-steel transition riser, tracer wire and warning tape.

#### 2.03 VALVES AND SPECIALTIES

- A. Domestic Water (shut-off): Stockham #255 Series (or equivalent by Apollo or Nibco) full port brass body ball valves, 600CWP/150SWP, solder or threaded ends.
- B. Domestic Water (check): Stockham #309Y/319Y (or equivalent by Apollo or Nibco) swing type, bronze body, bronze disc.
- C. Gas (2" and smaller): Crane #1228 (or equivalent by A.Y. McDonald) gas cock.
- D. Gas (2-1/2" and larger): Rockwell Figure 142/143 plug valve.
- E. Trap Primers: Precision Plumbing Products "Prime-Rite", installed per manufacturer's recommendations, or equivalent.
- F. Water Hammer Arrestors: Precision Plumbing Products, or equivalent, P.D.I. sizing.
- G. Access Panels: Milcor, or equivalent, minimum 10" x 10" size, stainless steel, key locks, vandal resistant.
- H. Pressure Gauges: Weiss Instruments (or equivalent by Trerice), #TL25, 2 1/2" dial, utility gauge, 0-100 psig (0" - 30" for vacuum) range.
- I. Thermometers: Weiss Instruments (or equivalent by Trerice) bimetal or industrial type with 0° to 160° range.
- J. Dielectric Fittings: Victaulic "Clear Flow" dielectric waterway.
- K. Floor Cleanouts (F.C.O.): J.R. Smith #4810 cover with U.P.C. bronze plug.
- L. Wall Cleanouts (W.C.O.): Terri, prime-coated, with U.P.C. bronze plug in no-hub test tee.
- M. Cleanout-to-Grade (C.O.T.G. at soil): Concrete yard box with C.I. lid marked "SEWER".
- N. Cleanout-to-Grade (C.O.T.G. at site concrete): Zurn #1400
- O. Expansion Tanks (at water heaters): Amtrol Therm-X-Trol #ST series, sized as shown on drawings
- P. Downspout nozzle: Zurn Z-199

#### 2.04 HANGERS AND SUPPORTS

- A. Provide hangers as specified herein, or equivalent galvanized or cadmium plated hangers by Elcen, Fee & Mason, or B-Line. Perforated strap is not approved for this project.

- B. Adjustable Hangers: B-Line #B3690. Provide shields at insulated piping.
- C. Trapeze Hangers: B-Line #B22 channel with pipe clamps and guides as required. Provide shields at insulated piping.
- D. Riser Clamps: B-Line #B3373 (steel, C.I.), 3B3373 CTC (copper).
- E. Offset Pipe Clamps: B-Line #B3148.
- F. Water Pipe Isolators: Include felt lining at each hanger.
- G. Hanger Rods: Galvanized, threaded, minimum 3/8" diameter.
- H. Upper Attachments: Galvanized steel for type of surface involved and for supported load.
- I. Seismic Restraints: B-Line OSHPD approved system or approved equivalent.

## 2.05 INSULATION

- A. Hot Water Supply/Return and Chilled Drinking Water Supply: 1" thick preformed fiberglass pipe insulation with all service jacket (ASJ) and fitting covers.
- B. Air Conditioning Condensate: 3/8" thick wall cellular plastic, Rubatex, Armaflex, or equivalent.
- C. Refrigerated Indirect Drains: 3/8" thick wall cellular plastic, Rubatex, Armaflex, or equivalent.
- D. Lavatory Traps and H.W. Supplies: Truebro #101 "Handi LAV-GUARD" insulation kit, or equivalent, grey color.
- E. Insulation shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50.

## 2.06 PLUMBING FIXTURES

- A. Fixtures shall be as scheduled on the drawings. Equivalent models by other manufacturers including Kohler or Eljer (for water closets, urinals and lavatories), Elkay (for stainless steel sinks), Oasis (for water fountains and remote chillers) and J.R. Smith, Wade or Josam (for drains) may be approved by the Architect.
- B. Provide all necessary angle stops, risers, escutcheons, 17-gauge CP traps, sealant, etc. as required for fixtures. All fixtures shall be white unless otherwise scheduled.
- C. Accessibility Requirements:
  - 1. Accessible plumbing fixtures shall comply with all of the requirements of CBC Part 2, Volume 1, Chapter 11B, Division 6
  - 2. Heights and location of all accessible fixtures shall be mounted according to CBC Section 11B-602 through 11B-612.
  - 3. Fixture controls shall comply with CBC Section 11B-601.3 for drinking fountains, 11B-604.6 for water closets, 11B-604.9.5 for children's water closets, 11B-605.4 for urinals, 11B-606.4 for lavatories and sinks, 11B-607.5 for bathtubs, 11B-608.5 for showers, and 11B-611.3 for washing machines and clothes dryers.
  - 4. Accessible sinks shall not exceed 6-1/2" in depth, Sinks shall be mounted with the front of the higher rim and counter surface 34" maximum above the finish floor or ground.

5. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

### PART 3 – EXECUTION

#### 3.01 DEMOLITION

- A. The Plumbing Contractor shall notify the Architect immediately upon encountering unknown existing utilities or piping arrangements that may require protection or relocation. Any discovery of this type shall require a decision from the Architect as to the final disposition of such a disclosure. Contractor shall not proceed in these areas until written approval has been given by the Architect or his representative.

#### 3.02 EXCAVATING AND BACKFILLING

- A. Provide all excavating, trenching, and backfilling required to install the work of this Section of the Contract. All excavating, backfilling and materials shall meet all requirements of Section 31 23 33 Trenching and Backfilling and as specified herein.
- B. Excavate to dimensions and depths indicated or necessary for work to be installed. Cut a minimum of 6" below required grade and place a 6" compacted sand bed to provide uniform grade and bearing for piping throughout its entire length. Excavations that are carried to unnecessary depths shall be refilled to the proper level with sand fill and thoroughly compacted to the density specified in the above referenced section.
- C. Shore and brace pipe trenches by members of suitable size and arrangement as required by OSHA and C.P.C. to provide against injurious caving and erosion during construction work, pipe laying and backfilling. Provide constant grade level watch personnel whenever workmen are in trenches over 5 feet in depth. Remove shoring, bracing and sheeting as excavation is backfilled. Provide suitable means to keep excavation free of water during all operations.
- D. All piping shall have a 6-inch neutral sand base and covered with 6-inch of neutral sand to form an envelope around the pipe.
- E. Backfill as rapidly as construction and testing will permit in a manner that will not disturb the pipe. Fill shall be placed by hand in 6-inch layers to a point 1-foot above top of pipe and shall be uniformly and thoroughly hand tamped. Backfill in well compacted 12-inch layers for the remaining portion of the work. All backfill shall be brought to grade and surplus dirt removed. All backfill shall be compacted as per drawings and specifications.
- F. No excavation below level of , or adjacent to, foundation or footings shall be made except in manner approved by the Architect.

#### 3.03 STRUCTURAL MEMBERS

- A. There shall be NO cutting of building structural members without prior written approval from the Architect or his representative.
- B. Where pipes are placed in partitions necessitating cutting of any non-structural member, metal ties shall be provided in accordance with applicable structural code.

#### 3.04 INSTALLATION OF PIPING, FIXTURES AND EQUIPMENT

- A. All piping shall be so routed and installed to clear beams, plates, footings and structural members. All piping shall be run in a neat and orderly fashion, generally level, free of traps or unnecessary bends and arranged to conform to building requirements.
- B. No piping shall be run exposed unless specifically indicated. Piping inside the building shall be run in partitions, furred ceiling spaces, over ceilings or in roof structure.
- C. Piping indicated to be exposed shall be parallel with or perpendicular to, as applicable, supporting wall, beam, or ceiling. Where various exposed runs of pipe are routed in the same general direction, such runs shall be routed and supported to form a pipe grouping.
- D. All piping shall be so graded and valved as to provide for the complete drainage, control and service of the systems. No piping shall be installed so as to cause unusual noise with the flow of water therein under normal conditions.
- E. Water Hammer Arrestors shall be installed as shown on drawings and at all quick close valves. Provide access panel large enough to remove water hammer arrestor.
- F. Air conditioning condensate shall slope toward drain point at 1/8" per foot minimum, 1/4" per foot where space permits.
- G. Indirect drains from miscellaneous equipment shall slope toward drain point. Insulate all refrigerated drains with material as specified herein in Paragraph 2.05.
- H. Provisions shall be made for expansion and contraction of all piping as required and necessary whether specifically shown or not. Expansion joints and the required guides thereto shall be so installed and located that the pipeline will be properly guided and anchored to force the joints to compensate for expansion and contraction.
- I. Equipment, fixtures, piping and accessories shall be individually mounted and/or hung from the structure and shall not be supported from ductwork, other piping, conduit or equipment. Approved hangers, mounts and supports shall be provided as specified in Part 2 of this specification section. Piping shall be supported at intervals specified in Paragraph 3.05 to keep it in alignment, carry weight of pipe and contents and prevent sagging.
- J. Plumber's tape or perforated metal strap are not acceptable for any type of hanger or support.
- K. All equipment and fixtures, floor and wall mounted, shall be securely bolted or sealed to the structure to prevent movement during seismic disturbances.
- L. Cast iron pipe shall be supported and anchored in accordance with Cast Iron Soil Pipe Institute, Cast Iron Soil Pipe and Fittings Handbook, Chapter 4; except that pipe hangers, clamps, rods, angle iron, concrete attachments shall be used; strap iron, wire staples, plumber's tape and wood are not acceptable.
- M. Pipe hangers and supports for insulated piping shall be sized to permit installation of insulation to pass unrestricted through them. Insulation shall be protected by insulation shields of size and weight required by service.
- N. Piping isolation: All uninsulated piping shall be provided with not less than 1/4- inch of soft sound-deadening material at all points of suspension and supports. It is intended that bare piping shall also be isolated from the structure at all points of contact, in addition to suspension and support points specified.

- O. Only self-drilling Phillips Drill Co. "Red Head" (ESR-3699) or Hilti "KB-TZ" (ESL-1067) anchors of type and proper size for service required shall be approved for use in concrete. No other type anchorage will be permitted unless approved by the Architect or his representative.
- P. Approved friction type wrenches shall be used in making up joints on all brass pipe. Marked or crushed pipe caused by wrenches, vices or machine chucks will be replaced at no additional expense.
- Q. Ends of all threaded pipe shall be reamed out smooth full size with long tapered reamer so as to be partially bell-mouthed and perfectly smooth. All threads of pipe shall be cut with new, clean dies, full thickness of die and so that no more than two threads are left exposed on pipe when joint is made up with approved pipe dope on male fitting only. Copper tubing shall be cut true and filed smooth and reamed to eliminate all burrs.
- R. Piping shall be full lengths except at ends of runs where necessary to make a cut-to-fit. Reducing fittings shall be used where changes in pipe sizes occur. Reducing bushings will not be permitted.
- S. Rough-in for and make final domestic water, distilled water, and drain connections and interconnections to Laboratory Fixtures and Laboratory Equipment including the installation of all loose controls furnished with equipment for remote installation, shut-off valves, floor drains and floor sinks. Install exterior acid waste tank, vault and remote monitoring equipment as shown on the drawings and as per manufacturer's written installation instructions. Obtain detailed written manufacturers' written rough-in/final connection data for all Laboratory fixtures and Equipment prior to installation of piping services.
- T. Where two or more fixtures are located in a row or battery, water supply header shall be continued full size extending past the last branch outlet.
- U. Keep inside of piping dry and free of dirt, cutting burrs and other foreign substances.
- V. Escutcheon plates shall be provided at all exposed piping passing through walls, floors or ceilings. Plates shall be solid or split ring type, chrome-plated.
- W. All piping to be used in this project shall be thoroughly cleaned inside and out before installation. Piping shall be capped for storage. Plumbing fixtures shall have all labels and protective coverings removed and finally cleaned with a cleaning agent approved by the Architect or his representative.
- X. Materials and equipment shall be provided with adequate protection when installed where damage may result by further construction, painting or plastering. If damage is incurred during construction, all damaged equipment shall be repainted, repaired or replaced as directed by the Architect.
- Y. Floor cleanouts shall be brought up to finished floor level, where shown on the drawings.
- Z. All vents shall be offset as necessary to miss beams and other structural members. No structural member shall be cut, bored or notched without specific written permission by the Architect. Vents shall be collected into single connections in attic spaces or walls where practicable so roof will be penetrated as few times as possible. Size all combined vents per CPC, Table 7-5
- AA. Pipe, Valve and Equipment I.D.: Piping: Seton, or equivalent, pressure sensitive labels applied per ANSI A13.1-1981, with directional arrows. Apply labels at all valve locations in addition to ANSI requirements. Valves: Seton, or equivalent, 1" diameter brass valve tags with jack chain. Provide valve chart in Owner's Operation and Maintenance Manuals. Equipment: Bakelite nameplates, permanently attached to equipment, engraved with item designator, i.e., "WH-1", etc.
- BB. Polyethylene (PE) gas piping, fittings, tracer wire and warning tape shall be installed in accordance with IAPMO IS-93.

CC. Polypropylene distilled water piping and socket fusion valves and fittings shall be installed only after receiving instruction in fusion connection techniques from Harrington Industrial Plastics, San Diego. Call for information at (858) 278-9311. Include this service as a part of the plumbing contract.

DD. Provide dielectric waterway fittings as specified herein wherever dissimilar metals are interconnected

### 3.05 PIPING HANGERS INSTALLATION

A. Unless shown otherwise on drawings, install hangers for horizontal runs of ferrous piping with the following maximum spacing:

1. Pipe up to and including 1 inch.....6 feet
2. Pipe 1-1/4 inches to 3 inches.....10 feet
3. Pipe 3-1/2 inches and 4 inches.....13 feet
4. Pipe 5 inches to 8 inches.....16 feet
5. Cast iron soil pipe.....4 feet

B. Note that hanger spacing is based on beam strength characteristics of pipe; provide closer spacing as required to interface with building structure.

C. Unless shown otherwise on drawings, install hangers for horizontal runs of copper piping with the following maximum spacing:

1. Pipe up to 1/2 inch in size.....5 feet
2. Pipe 3/4 inch to 1-1/2 inches.....6 feet
3. Pipe 2 inches.....8 feet
4. Pipe 2-1/2 inches and larger.....10 feet

D. For all piping, install a hanger within 2 feet of each elbow or tee. Install additional supports for valves and strainers. Install not less than one hanger per length of cast iron pipe and as required by CPC. Support vertical risers by riser clamps as specified herein at each floor.

E. Galvanized hanger rod sizes shall meet requirements of the following schedule:

1. Pipe up to and including 2 inches.....3/8 inch rods
2. Pipe 2-1/2 inches to 3-1/2 inches.....1/2 inch rods
3. Pipe 4 inches and 5 inches.....5/8 inch rods
4. Pipe 6 inches and larger.....3/4 inch rods

### 3.06 PIPE SLEEVES AND FLASHINGS

A. Provide pipe sleeves made of No. 22 gauge galvanized steel, properly secured in place with approximately 1/4 inch space between each sleeve and pipe surface and insulation passing through the sleeve for pipes which pass through concrete floors, roofs and masonry walls. Install pipe sleeves in place as walls and floors are built up. Provide sleeves for insertion into structural building parts. Make space between sleeves and pipes passing through concrete floors, exterior walls and roofs watertight and fire resistant with approved non-hardening mastic material. Sleeves through pipe chase floors shall project a minimum of 1 inch above floor and shall be galvanized steel. Use Link-Seal "Century-Line" thermoplastic sleeves or Schedule 40 galvanized steel for sleeves through foundation walls.

B. Restore fire rating of floors or walls at all pipe penetrations by packing with fire-safing, grouting, or other approved means.



- C. Pipe Flashings: Semco or R.K. Industries, 4 pound lead, 8” skirt, with counter flashing sleeve at sanitary vents.
- D. Provide dielectric waterway fittings as specified herein wherever dissimilar metals are interconnected.

3.07 TESTING

- A. The type of test, the test pressure and the duration of each test for each of the piping system shall be made in accordance with the following:
- B. Piping: Each piping system shall be tested as specified below in sections or upon completion of systems or both. However, piping shall not be concealed until it has been tested, inspected and approved. Test time will be accrued only while full test pressure is on system. Tightening of flange joints under pressure is permissible. It shall be the responsibility of Contractor to remove during test anything on system that will not withstand pipe test pressure called below and replace same on completion of testing. All equipment damage resulting from negligence is the responsibility of Contractor.
- C. SPECIAL NOTE: Testing of systems covered by local, State or national codes shall be tested as herein noted or in accordance with the applicable codes, whichever is the most stringent.

<u>System</u>	<u>Medium</u>	<u>Pressure</u>	<u>Duration</u>	<u>Tolerance</u>
Soil, waste, Storm	Water	Top of highest Vent or (10’) head of water	4-hours	No joint sweat
Domestic Water lines	Water	150 psi	4-hours	None, except temp. change
Natural Gas	Air	60 psig	1-hour	None, except temp. change

NOTE: Air for testing shall be oil-free.

3.08 INSULATION

- A. All piping shall be pressure tested as in paragraph “Tests,” thoroughly cleaned and approved before the application of any insulation.
- B. Insulation adhesives shall have no flash point wet or dry.
- C. Domestic hot water supply and return, chilled drinking water supply, air conditioning condensate drains, refrigerated equipment drains shall be insulated as specified herein installed in accordance with insulation manufacturers’ recommendations.

3.09 VALVES AND SPECIALTIES

- A. All valves and specialties throughout the plumbing systems shall be as specified in Paragraph 2.3 and installed in accordance with manufacturer’s recommendations.

- B. Valves shall be provided where shown on plans and as specified herein.

### 3.10 PLUMBING FIXTURES AND MISCELLANEOUS EQUIPMENT

- A. All fixtures shall be anchored and set level with relation to walls and floor lines in a neat and workmanlike manner using equal spacing and neat grouping.
- B. Fill all joints between plumbing fixtures and walls or floors or cabinets with Dow-Corning 780 Sealant or Sonolastic Sealant, color to match fixtures. Sealant shall be applied as recommended by the manufacturer, workmanship subject to approval of Architect or his representative.
- C. Wall mounted fixtures shall be securely attached to 3/8-inch thick x 6-inch wide steel wall plate extending one stud beyond the fixture mounting points and bolted to each stud it passes with two 3/8-inch bolts or welded. Plates may be welded to steel studs. Drill and tap plate for installation of fixture. Lavatory arm carrier shall be bolted or welded to the 3/8 inch thick x 6 inch steelplate.
- D. All fixtures shall be covered and protected until completion of the work. Fixtures shall be cleaned and all fittings shall be polished. Metal parts shall be polished chrome plated brass unless otherwise indicated. All exposed piping and fittings shall be polished chrome plated.

### 3.11 VIBRATION ISOLATION REQUIREMENTS FOR THE PLUMBING SYSTEM

- A. General: There shall be absolutely no rigid contact between any domestic cold water line, hot water supply or return line, waste, vent or storm drain pipe within the occupied building area and the building structure (the building structure includes slabs, ceilings, studs, drywall, ductwork, conduit etc.) except as follows:
  - 1. At the connection to the plumbing trim or fixtures.
  - 2. Through an approved vibration isolator.
- B. Seal all fixture water supply and drain pipe penetrations of finished walls with acoustical sealant.

### 3.12 STERILIZATION

- A. The Plumbing Contractor shall provide feed and flush nipples near point of connection of new piping to building hot and cold water system to facilitate systems flushing and chlorinating.
- B. Provide the services of a commercial disinfecting/chlorinating company to perform standard commercial water systems sterilization, Atlantis Chlor, Walsh Enterprises or equivalent.
- C. Flush out all new water piping to thoroughly remove all dirt and debris.
- D. Chlorinate all new water piping up to points of connection to existing building systems.
- E. Flush solution with clear water and until residual chlorine levels are equal to level of incoming City water supply.
- F. Obtain test samples of flushed out systems and test to verify that total plate count of bacteria/c.c. of sample is less than 100 or equal to the supply and for negative coliform organisms per ANSI/AWWA C651-92. Testing shall be performed by a State of California approved water testing laboratory.
- G. Repeat the above procedure until results in paragraph F above are obtained.
- H. Provide certificates of final satisfactory test results as part of close out requirements.

END OF SECTION 22 00 00

SECTION 23 00 00 – HEATING, VENTING AND AIR CONDITIONING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section and shall govern the work the same as though written herein in full. It is the intent to provide a complete tested, balanced and operating heating, ventilating and air conditioning system.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, fixtures and services together with the demolition, installation, testing and adjusting necessary to the acceptable completion of all the heating, ventilating and air-conditioning (HVAC) work shown on the drawings or as herein specified.
- C. Description of the Systems: The following list is intended to generally describe the various HVAC systems components to be installed, but shall not be considered as a limit of the work to be performed under this section of the specifications.
  - 1. Rooftop Package Heat Pumps
  - 2. Rooftop ERV units
  - 3. Automatic Temperature Control including low voltage wiring
  - 4. Ductwork systems and accessories
  - 5. Toilet Exhaust Systems
  - 6. General Exhaust Systems
  - 7. Air distribution equipment
  - 8. Insulation and duct liner
  - 9. Testing, Adjusting and Balancing
- D. Related Work not in this Section:
  - 1. The following work will not be furnished under this section of the specifications but will be included in other specification sections:
    - a. All line voltage wiring (regardless of voltage ) and all miscellaneous wiring devices and all connections thereto and all line and low voltage conduit. All electrical disconnects and starters not integral to equipment scheduled and / or specified. All timeclocks and miscellaneous “on-off” control devices.
    - b. Openings in wall and roofs
    - c. Roofing, including flashing
    - d. Condensate drains
    - e. Direct digital control system (DDC) in Section 23 09 13
    - f. Finish painting
- E. Work Under Seperate Contracts
  - 1. Automatic fire protection will be designed and installed under separate contract with the Owner.

1.02 SUBMITTALS

- A. The HVAC Contractor shall provide submittal data for all equipment and material being furnished by him to the Architect for approval. Submit the following according to the Conditions of the Contract and Division 1 Specifications Section: 01 33 00.

1. Product Data for:
    - a. Ductwork, ductwork accessories and supports.
    - b. Dampers, all types including combination fire/smoke dampers
    - c. Fire-safing material
    - d. Supply, return and exhaust grilles and diffusers
    - e. Pipe and Duct insulation and acoustical duct liner
    - f. Insulated flexible duct
    - g. Filters
    - h. Gauges and thermometers
    - i. Duct sealant and coatings
    - j. Heating hot water boilers and pumps
    - k. Energy recovery ventilators (ERV's)
    - l. Exhaust fans, all types
    - m. Fan-coil and makeup fan-coil units
    - n. Variable frequency drives (VFD's)
  2. Wiring diagrams for:
    - a. all equipment requiring power
- B. Each submittal brochure shall contain all of the items listed above and shall be bound with covers, indexed with tabs and have a table of contents. Submittals shall indicate make, specific model and size, accessories, dimensional drawings, wiring diagrams and other pertinent information. Submit all items at one time. Partial submittals are not acceptable. Substitutions of materials and fixtures form that specified herein, noted on the drawings or as outlined in the General or Supplementary Conditions shall be clearly identified as deviations. Deviation data to clearly demonstrate equivalency and comparisons between specified and proposed items shall be provided by the HVAC Contractor unless prior arrangements are made to compensate the Engineer for researching this data. This data shall specifically include tabulated comparisons between scheduled and proposed equipment in the following areas:
1. Weight (including curbs and other accessories).
  2. Dimensions
  3. Electrical requirements (voltage, phase, full load amps).
  4. Sound levels
  5. Performance (efficiencies, heating, cooling, air flow, static pressure, pressure drops, etc.)
- C. "Equivalent" submittals lacking above information will be returned "not reviewed". Approval of substitutions shall in no way relieve the HVAC Contractor from the responsibility of complying with the design intent of the plans and specifications and for installation in the space available.
- D. Shop Drawings for coordination, fabrication, and installation:
1. Dimension drawings for concrete pad equipment foundations including bolt sizes and locations (1/4" scale minimum).
  2. Details of suspension, supports and seismic restraint and anchors for above ceiling hung equipment.
  3. Chilled and hot water piping drawings (1/4" scale).
  4. Ductwork fabrication and installation drawings for all congested areas including laboratory classrooms with fume hood exhaust and make-up air and laboratory classrooms with formaldehyde venting and makeup air.
  5. The contract HVAC drawings shall not be used and substituted for ductwork and piping shop drawings.

6. Coordinate location of piping and ductwork systems with electrical, plumbing and fire protection systems in the preparation of shop drawings. Provide number of copies of prints of piping and ductwork as required by the Owner's representative for use in coordination with the other trades.
- E. The following submittals for closing out the job shall be a prerequisite to the issuance of Final Certificate of Payment:
1. Test and Balance Reports
  2. Reproducible "As-built" (record) drawings
  3. Approved inspection reports
  4. Guarantee

### 1.03 QUALITY ASSURANCE

- A. Work of the Contract Documents shall satisfy the requirements of:
1. Air Diffusion Council (ADC).
  2. ASME, ASTM and ANSI standards for base materials.
  3. California Fire Marshal requirements for fire and smoke dampers.
  4. ASHRAE standards for heat transfer coils and air filters.
  5. National Fire Protection Association standards (N.F.P.A.).
  6. SMACNA Seismic Restraint Manual Guideline for Mechanical Systems.
  7. 2016 California Building Code (C.B.C.).
  8. 2016 California Mechanical Code (C.M.C.) ( Title 24, Part 4 )
  9. 2016 California Fire Code (C.F.C.).
- B. Where these drawings and specifications call for or describe materials or construction of a better quality or larger sizes than required by all laws, codes, ordinances, rules, regulations and orders of any public authority bearing on the performance of the work, the drawings and specification shall take precedence.

### 1.04 PRODUCT AND EQUIPMENT DELIVERY, STORAGE AND HANDLING

- A. Exercise care in transporting and handling to avoid damage to and contamination of materials and equipment.
- B. Materials and equipment kept at the job site shall be stored in enclosures or under protective covering to prevent physical and weather damage or the introduction of foreign material. Material and equipment shall be stored above grade in manufacturer's original, unopened protective packaging and kept as clean and dry as possible.
- C. Damage to materials and/or equipment due to negligence in handling, storage or delivery shall be cause to reject and replace all such damaged material and/or equipment at the Contractor's own expense with no additional cost to the Project.

### 1.05 PROJECT CONDITIONS, SUPERVISION AND WORKMANSHIP

- A. The HVAC Contractor shall examine the complete project drawings and make a preliminary examination of the site. The HVAC Contractor shall also examine in advance methods for installation, means to be provided for getting ductwork and equipment into place and any other requirements of the work. This shall include verification that all systems and all equipment will fit spaces allotted. Work shall be installed so that indicated ceiling heights are maintained, with no portion of the work requiring excessive furring.

- B. The HVAC Contractor must consider and include any additional cost involved in verifying and coordinating the work with existing conditions and points of connection. If situations arise where the work cannot be installed as intended, the Owner's representative must be informed to assist in resolving the problem.
- C. Maintain ample headroom in passageways and rooms, and clearance around all equipment, ductwork, conduits and pipelines shall be maintained for unrestricted passage and for easy servicing. Install the work to maintain indicated ceiling heights.
- D. The HVAC Contractor shall provide all the rigging, scaffolding, tools, tackle, hoists, personnel safety equipment, labor, etc., necessary to complete the installation of equipment and materials in accordance with the intent of this specification.
- E. The HVAC Contractor must coordinate all areas of the work required with the Owner's Representative as they relate to material, storage, trash removal, hours of work, job site office, telephone, sanitary facilities, electrical power, drinking water, hoisting, temporary barriers, safety measures, etc., including cost of such items.
- F. The HVAC Contractor is responsible to coordinate demolition and reconstruction (cutting and patching) of walls, floors, and ceilings required for the performance of the work of this Section of the Contract. The appropriate Contractor shall perform the actual work of demolition and reconstruction of walls, floors and ceilings.
- G. The HVAC Contractor shall have a competent Job Superintendent and/or Foreman on-site or available at all times by phone ("pager") during project progress with authority to act on the Contractor's behalf and to supervise the installation of the work under this section. Superintendent shall also be responsible in conferring with other trades as to the proper execution and conduct of the work under this section so that work may be carried on as rapidly as possible and still maintain coordination with the other trades in progress at the same time.
- H. All workmanship shall be first class in every respect and shall be performed only by skilled mechanics recognized as such in each of their respective trades.

#### 1.06 DESCRIPTION OF THE SYSTEMS

- A. The following list is intended to generally describe the various HVAC systems components to be installed, but shall not be considered as a limit of the work to be performed under this section of the specifications:
  - 1. Heating Hot Water Boilers
  - 2. Heating Hot Water Pumps
  - 3. 4-Pipe Fan-Coil and Units
  - 4. Energy Recovery Ventilators
  - 5. Direct Digital Control (DDC) System
  - 6. Ductwork systems and accessories
  - 7. Toilet exhaust systems
  - 8. General exhaust systems
  - 9. Laboratory Fume Hood exhaust and make-up air systems including connections to fume hoods including exhaust and make-up air control valves.
  - 10. Laboratory Exhaust (formaldehyde venting) Exhaust Fans
  - 11. Air distribution equipment
  - 12. Duct and Pipe Insulation and duct liner
  - 13. Testing, Adjusting and Balancing.

#### 1.07 DRAWINGS AND SPECIFICATIONS

- A. Drawing and specifications are intended to complement each other and are required to be taken together to provide all associated items of work, materials and equipment necessary for a complete installation.
- B. A set of HVAC drawings will accompany these specifications showing the arrangements and sizes of ductwork and piping systems. Drawings and specifications are intended to complement each other to the extent that all associated items of work and materials necessary to the completion of the installation of the systems shall be provided whether or not mentioned in the specifications or shown on the drawings.
- C. Discrepancies between Architectural and HVAC drawings: In the case of discrepancies between the Architectural drawings and the HVAC drawings, the drawing showing the greater number of items or pieces of equipment shall govern unless otherwise directed by the Architect. Discrepancies encountered among drawings are to be brought to the attention of the Architect for clarification. In the case of diffusers, thermostats or other mechanical items indicated on architectural drawings but not on HVAC drawings, specifications for such items shall be deemed to be respectively similar to other such items which are covered by specifications and all necessary services and appurtenances shall be provided. Discrepancies as described above are inadvertent and it shall be the Contractor's responsibility to check the intent of this paragraph.
- D. HVAC work, as laid out, is to some extent, diagrammatic and locations thereon are drawn to scale where possible. It is not the intention of the drawings to show all the offsets, fittings, and accessories. Locations indicated shall be adhered to as closely as possible; reasonable deviations therefrom shall be made at no additional expense.

1.08 PERMITS AND FEES

- A. Contractor shall arrange for inspections required by authority having jurisdiction. Deliver any certificates of such inspections to the Owner.
- B. Owner shall apply and pay for all permits required by any public authority having jurisdiction. Owner shall pay for all inspections required.

1.09 RECORD DRAWINGS

- A. Submit reproducible record ("As-Built") drawings as required by the General Conditions showing final locations of all equipment, piping and ductwork.

1.10 GUARANTEE AND OPERATION

- A. The HVAC Contractor shall furnish to the Owner a guarantee in writing. All work shall be guaranteed for a minimum period of one year from either the official date of completion or from the official date of acceptance by the Owner whichever is the later date.
- B. It is to be understood that any equipment and systems requested in writing to be put into service by the Owner to serve their needs while the project is still under construction and used for that purpose only, shall be considered as accepted on the date said equipment is put into operation. The warranty for any such particular piece of equipment shall then be in effect as of the day of acceptance. Date of acceptance for all other materials and equipment not so used shall become effective on the date of acceptance for the entire project by the Owner.
- C. Guarantee shall warrant all materials and equipment to be free from defects whether they be of faulty manufacture or defective workmanship, and the HVAC Contractor shall agree to replace any such



material or equipment at his expense that may prove defective from either cause within the warranty period.

## PART 2 – PRODUCTS

### 2.01 GENERAL

- A. All materials and equipment shall be new, full weight, of best quality suitable for desert environment, with the same brand of manufacture used for each class of material or equipment. All similar materials and equipment such as heat pumps, fans and air distribution devices shall be of the same type and manufacture unless specified otherwise. All equipment and devices shall be designed for resistance to earthquake disturbances. All equipment shall have motors, controls, accessories and fans properly fastened to the equipment to prevent “break-away” during an earthquake. All rotating equipment shall operate in factory standard dynamic balance. Failure to comply with these conditions shall be cause for rejection of any such material or equipment installed; the HVAC Contractor shall be so advised and shall be subject to removing all rejected material or equipment and replacing same with approved material or equipment at his expense.

### 2.02 MOTORS AND CONTROLLERS

- A. Furnish with each piece of equipment all motors and solid state controls.
- B. Motors shall conform to latest NEMA motor standard requirements and shall be manufactured by Gould, GE, Louis Allis or Marathon of a type suitable for service intended. Motors shall be rated to operate at an ambient temperature of 40° C. Oiling devices shall be located where readily accessible. In general, motors of ½ HP capacity or larger shall be three phase, and smaller motors shall be single phase. Motors for belt-driven equipment shall be provided with adjustable slide rails. Nameplate horsepower of motor submitted shall be equal to or greater than scheduled horsepower and shall be greater than required brake horsepower to handle load. All motors shall be premium high efficiency models where available.
- C. Starters for equipment other than packaged air-cooled chillers shall be provided by Division 26 Electrical.
- D. Variable Frequency Drives (VFD’s) shall be provided with the equipment being controlled as a part of that equipment package. VFD’s shall be provided with a BacNet interface to ensure compatibility with the project direct digital control (DDC) system.
- E. Electrical devices that fall within scope of UL testing capabilities shall be so tested and marked.

### 2.03 SHEET METAL DUCTWORK

- A. All ductwork shall be constructed of new galvanized prime grade steel sheets in accordance with Duct Construction Standards published by Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA). Fume hood and formaldehyde exhaust ductwork shall be 4 mil inside/1 mil outside PVS coated 20 gage spiral galvanized steel.
- B. Unless otherwise noted on Drawings, pressure-velocity classification of supply and return ductwork from HVAC units and fans shall be in accordance with Table 1-1 of SMACNA Manual.
- C. Installed ductwork shall meet “Functional Standards for Rectangular Low Pressure Ducts” cited in SMACNA Manual with respect to sheet deflection and vibration, reinforcing, seam and joint integrity, beam strength of duct section and duct leakage.

- D. Ductwork gauge and reinforcing shall comply with Tables 1-3 through 1-5 of SMACNA Manual to specified or noted static pressure rating.
- E. Duct sizes 19 inches to 48 inches wide and larger which have more than 10 square feet of unbraced panel shall be beaded or cross-broken unless ducts have nonconductive covering or acoustical liner. See Figure 1-8 of SMACNA Manual.
- F. For duct longitudinal seams use button punch snap lock for up to 20 gauge metal. Use Pittsburgh lock for up to 18 gauge metal and for fittings.
- G. Duct connectors shall be as follows or connectors of equal performance.
  - Width 0 to 60 inches: S-Slip.
  - Depth 0 to 18 inches: Drive slip.
  - Depth 19 to 30 inches: Reinforced drive slip.Corner closures shall be as shown on Figures 1-13 through 1-18 of SMACNA Manual or as recommended by duct connection system manufacturer.
- H. Provide turning vanes in each square elbow. Construct turning vanes as shown in Figures 2-3 and 2-4 of SMACNA Manual. Use single thickness turning vanes with  $\frac{3}{4}$  inch flat trailing edge for velocities below 2000 FPM. For higher velocities use double thickness turning vanes.
- I. Duct transition and offsets shall be as shown in Figure 2-9 of SMACNA Manual.
- J. Main or parallel duct splits shall be as shown in Figure 2-7 of SMACNA Manual. Splitter blade shall be 16 gauge minimum and leading edge shall be hemmed.
- K. Round laterals and branches shall be made up with 45° taps and saddles to round or rectangular main or branch ducts as shown in SMACNA figure 3-4.
- L. Each individual air supply or return device, whether sidewall or ceiling diffuser, shall be fitted with a device to permit adjustment of air amount supplied to unit independently of any other outlet. These devices may take the form of outlet boots with opposed blade dampers, or of branch duct with dampers, as installation conditions dictate, but in any case, each shall be fitted with a means of manual adjustment of air amount delivered to outlet.
- M. Unless otherwise noted on drawings, duct sizes shown on drawings are for net free area.

#### 2.04 DUCT AND PIPING INSULATION

- A. General: All instructions and associated materials such as coverings, vapor barriers, mastics and adhesives shall bear the Underwriters' Laboratories listing. U.L. rating not to exceed: flame spread 25, smoke developed 50. Insulation shall meet the requirements of NFPA Pamphlet No. 90-A and 2016 California Mechanical Code. The insulation Contractor shall provide a certificate that the system is installed and all materials comply with the Underwriters' Laboratories requirements. All insulation shall be delivered to the job site in unopened packages from the manufacturer. Approved manufacturers: Certainteed, Owens-Corning, Manville, Knauf.
- B. Duct wrap: 1 1/2 inch thick Fiber Glass, faced with Type IV (scrim-reinforced foil-craft laminate vapor barrier), 2 inch overlap tab along edge, 1-lb. density.
- C. Insulate all heating hot water and chilled water piping with 1-1/2" thickness (runouts may be 1/2" thickness) fiberglass pipe insulation with FSK jacket, Knauf 1000 Degree or approved equivalent.

Provide molded fitting covers at all elbows and B-Line #B3154 metal shields at all pipe hangers.  
Cover all insulated piping exposed to the weather with aluminum jacketing.

2.05 DUCT LINER

- A. General: All liners and associated materials such as coverings, vapor barriers, mastics and adhesives shall bear the Underwriter's Laboratories listing. U.L. rating not to exceed: flame spread 25, smoke developed 50. Insulation shall meet the requirements of NFPA Pamphlet No. 90-A and California Mechanical Code. The insulation Contractor shall provide a certificate that the system is installed and all materials comply with the Underwriter's Laboratories requirements. Any liner delivered to the job site shall be in unopened packages from the manufacturer. Approved Manufacturers: Certainteed, Owens-Corning, Manville, Knauf.
- B. Provide duct liner in plenums and ductwork where indicated on plans in accordance with SMACNA "Duct Liner Application Standard," 2nd edition.
- C. Unless otherwise noted on drawings, use flexible duct liner with 1-1/2 pound density, 1 inch thickness.
- D. Duct liner shall be adhered to sheet metal and with edges coated with one of the adhesives conforming to Standard for Adhesives for Duct Liner, ASC-A-7001C-1972, OF Adhesive Sealant Council, Inc. Duct liner shall be further secured with fasteners conforming to Mechanical Fastener Standard, MF-111975, on page 22 of Duct Liner Application Standard.

2.06 FLEXIBLE CONNECTIONS

- A. Furnish flexible connections fabricated of Durolon fabric with Hypalon coating, Metal Fab or Super Metal Fab, which shall meet requirements of UL test procedure UL-214. Fabric shall be coated on exterior side, with inorganic elastomeric compound and shall be able to withstand exposure to 250° to -50° F and shall be ozone resistant and airtight. Connectors shall be pre-assembled utilizing 24 gauge metal edges and shall have 3 inches or 6 inches as required exposed fabric and shall be as manufactured by Duro-Dyne Corporation.

2.07 ACCESS DOORS

- A. Provide access doors in ductwork to provide access to automatic dampers, fire and smoke dampers. Where ducts are insulated access doors shall be double skin doors with 1 inch insulation in door. Where size of duct permits, doors shall be 18 inches x 16 inches. Doors 24 inches x 16 inches and larger shall be provided with Ventlok No. 100 or 140. Provide identification for fire and/or smoke damper access openings. Stencil the words FIRE (or SMOKE) DAMPER on access doors in sheet metal ducts.

2.08 INSULATED FLEXIBLE DUCT

- A. The flexible duct for connection between ducting and air diffusers and grilles shall be a factory fabricated assembly consisting of an inner sleeve, insulation and an outer moisture barrier. The inner sleeve shall be constructed of an elastomeric compound helix. No installed flexible duct lengths shall exceed 8'-0". U.L. rating not to exceed: flame spread 25, smoke developed 50
- B. A minimum 1 inch thick fiberglass insulating blanket shall encase the inner sleeve and be sheathed with an outer moisture barrier of a reinforced metalized Mylar/neoprene laminated or equal.
- C. Acoustical performance of the flexible duct shall be in accordance with Air Diffusion Council Flexible Air Duct Test FD72R1: Paragraph 3.2.1, Sound Attenuation. The test data shall be made by accredited independent testing laboratory in accordance with the above testing procedure.

- D. Materials shall be Automation industries, Inc. Thermaflex G-KM Class I flexible air duct or equal, rated for 6" positive to .5" negative pressures.
- E. Aluminum flexible ductwork is not an approved material for this project.

#### 2.09 FIRE/SMOKE DAMPERS

- A. Furnish and install all fire, smoke and combination fire/smoke dampers as required by the 2010 California Building and Mechanical Codes. Dampers shall be U.L. labeled and shall comply with the requirements of N.F.P.A.-90A, and shall be approved by the State of California Fire Marshal. Dampers shall be Ruskin, Greenheck or approved equivalent, as follows:
  - 1. Fire – Style B (rectangular), 95% or greater free area, rated for surface penetrated.
  - 2. Fire – Style C (round), 100% free area, rated for surface penetrated.
  - 3. Smoke – SD35 or SDRS25, 120 volt operator.
  - 4. Combination Fire/Smoke – FSD35, 120 volt operator.
- B. Provide smoke detectors for smoke damper operation, located as required per 2010 CMC.

#### 2.10 MANUAL BALANCING DAMPERS

- A. Provide Ruskin MD-35 or equivalent opposed blade manual balancing damper fabricated from galvanized steel.
- B. Provide minimum 22 gauge butterfly type damper with locking damper/quadrant and regulator set for round duct.

#### 2.11 GRILLES, REGISTERS AND DIFFUSERS

- A. Grilles, registers and diffusers units shall be all metal and constructed to have a neat, well-made appearance. Grille framework shall be rigidly constructed; flange corners shall be mitered and supported. Face bars shall be of heavy gauge metal to adequately resist bending or twisting and fit tightly and closely within framework. Units shall have a neck to slip inside ductwork for an airtight noiseless connection.
- B. Check drawings to supply proper outlets and adapting framework for type of construction at each outlet. Adapter shall be same finish as unit and be of configuration manufacturer recommends for construction involved.
- C. Manufacturer furnishing grilles, registers and diffusers shall verify sizes against CFM requirements for each outlet to get intended throw without objectionable noise.
- D. Provide grilles, registers and diffusers as scheduled on the drawings, Krueger, Metalaire, Titus, J & J, Price or Tuttle and Bailey.

#### 2.12 DISPOSABLE AIR FILTERS

- A. Air filters shall be Farr 30/30, ECO-AIR #E35, or approved equivalent, pleated type.
- B. Provide two sets of filters for equipment requiring filters. Filters in heat pumps shall be 2 inches thick, disposable type.

- C. Filters shall have a rated average dust spot efficiency of 25-30% when tested in accordance with ASHRAE 52.1 test method.
- D. Filters shall be capable of operating with face velocities up to 500 FPM without impairing efficiency and shall have an initial resistance not to exceed 0.17 inch W.G. and shall be listed Underwriters Laboratories 900 Class 2 and with State of California Fire Marshal.

#### 2.13 DUCT SEALANT/PROTECTIVE COATINGS

- A. Sealant for interior longitudinal and transverse duct seams shall be United McGill "UNI-GRIP" vinyl acrylic type, or equivalent by Foster.
- B. For ducts exposed to the weather use United McGill "UNI-WEATHER" all weather duct sealer, or equivalent by Foster
- C. For ducts exposed to the weather coat ducts with appropriate primer for finish painting by Painting Contractor.

#### 2.14 EQUIPMENT

- A. All equipment shall be of manufacturers and capacities as scheduled herein or on the drawings or approved equivalent by:
  - 1. Roof top package units: Carrier as scheduled (No known equivalent).
  - 2. Exhaust Fans: Greenheck as scheduled or equivalents by Cook.
  - 3. Energy Recovery Ventilators: MicroMetl as scheduled.
  - 4. Make-Up Air Units: Champion, or equivalent.
  - 5. Air Distribution: Titus as scheduled or equivalent by Price, Metalaire.
  - 6. Fire and Fire/Smoke Dampers and Access Panels: Ruskin as specified herein or equivalent by Greenheck, Potorff or ABI.

### PART 3 – EXECUTION

#### 3.01 VERIFICATION

- A. Before fabrication and installation of work, carefully verify all dimensions, sizes and actual building conditions. Coordinate work with other affected trades to avoid possible conflicts and resolve same where such exist. Install work to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear.
- B. Work shall be installed so that ceiling heights indicated are maintained with no portion of work requiring furring. Changes necessary, resulting from lack of such verifications and coordinations, shall not be a cause for additional expense.
- C. Air distribution devices, access panels and controls shall be located within rooms as indicated on the architectural and HVAC drawings. In the event these drawings do not indicate exact locations, such locations shall be obtained from the Architect. In the event they are installed without instruction and if directed to be relocated as a result, they shall be moved and reinstalled without additional cost. Submit all pertinent information as to size, location and approximate number of additional access panels required. It shall further be the responsibility under this section to confer with all the trades on the project, and, wherever possible, dampers or other equipment shall be so grouped so that the least number of panels will be required.

- D. Diffusers, grilles, registers, controls, thermostats, etc., shall be located within rooms as indicated on Architectural and HVAC drawings. In the event these drawings do not indicate exact locations, such locations shall be obtained from the Architect. In the event they are installed without instruction and if directed to be relocated, they shall be moved and reinstalled without additional expense.

### 3.02 GENERAL INSTALLATION

- A. Because of small scale of the drawings, it is not intended that all of the offsets and accessories required be shown. All equipment apparatus, ductwork, piping and associated accessories shall be installed as closely as possible to indicated locations on drawings; but reasonable necessary deviations therefrom shall be made at no additional expense.
- B. There shall be NO cutting of structural members without prior written approval from Architect or his representative.
- C. Equipment shall be installed in locations shown in accordance with the equipment manufacturer's written installation instructions. Maintain all necessary clearances for air flow, access, repair and to electric control panels, etc.

### 3.03 HANGERS, MOUNTS AND SUPPORTS

- A. Equipment, piping, ductwork and accessories shall be individually mounted and/or hung from the structure. Approved hangers, and curbs shall be provided.
- B. Ductwork support upper attachments shall comply with Figures 4-1 and 4-2 of SMACNA Manual.
- C. Ductwork support lower attachments shall comply with Figure 4-4 of SMACNA Manual..
- D. Hanger sizes shall be per Tables 4-1 and 4-2 of SMACNA Manual.

### 3.04 CLEANING AND PROTECTION

- A. Interior of ductwork and equipment shall be cleaned and all scale, sand and dirt removed before closing and shall remain closed until final connections or extensions thereto are made.
- B. Equipment shall be provided with adequate protection when installed where damage may result by further construction, the weather, painting or plastering. If damage is incurred during construction, all damaged equipment shall be repainted, repaired or replaced to match new construction with no additional cost to Owner.
- C. Protective guards: All exposed parts such as shafts, couplings, drives and associated items shall be covered with guards to comply with the California State Safety Orders of Division of Industrial Accidents. Where guards are covering belt drives, provision shall be made for checking the RPM of the rotating parts.

### 3.05 DUCTWORK SYSTEMS

- A. Install all supply ductwork, return ductwork and exhaust ductwork in accordance with SMACNA recommendations and California Mechanical Code.
- B. Provide flexible ductwork only where indicated.
- C. Run ductwork in straight lines parallel with, or at right angles to, the lines of the building unless otherwise shown on the drawings.

- D. Run ductwork so as to not to interfere with doors, or other openings, or to prevent access to equipment.
- E. Conceal all ductwork except in equipment room(s) or where noted otherwise on drawings.
- F. Seal all duct seams and joints so the leakage rate is less than 5% of the system operating air flow.
- G. Provide final duct connections to all equipment requiring same and furnish all material required for final connection.
- H. Install ductwork and accessories to provide a system free from buckling, warping, leaking, vibration, rattles and objectionable noise.
- I. Fabricate and install exposed ductwork on the roof so as to shed rainwater off the top surface with no ponding at any point.
- J. During and after complete installation of ductwork, entire system shall be cleaned of rubbish, plaster, dirt and other debris before any grilles, outlets or registers are installed.
- K. Use radius elbows wherever possible. Where indicated or where space or condition does not permit use of radius elbows, use square elbows with turning vanes as specified herein.
- L. Flange duct openings where grilles and registers are attached. Paint the inside of all supply, return and exhaust ducts one coat of flat black paint, wherever the duct or duct liner is visible through openings. Exposed interior ducts through walls, ceilings, roofs, etc., shall have a metal collar to conceal opening between duct and finished surface.
- M. In reducing from one duct size to another, provide an angle of not more than 15 degrees from line parallel to air flow, for low pressure ductwork.
- N. Inlet and discharge connections to all air handling equipment shall have flexible connections.
- O. Multi-blade dampers, splitter dampers, extractors, turning vanes and other devices shall be provided where shown on drawings and where required to balance the air systems.
- P. Where ducts are insulated on inside (liner), dimensions shall be increased as required for thickness of liner beyond dimensions shown. Sizes indicated are net clear dimensions.

### 3.06 INSULATION INSTALLATION

- A. Duct Liner: Liner shall be adhered to all interior sides of duct with 100% coverage of Underwriter's Laboratories listed self-extinguishing adhesive such as Benjamin Fosters' 85-20 "Spark Free" or Minnesota Mining 38. Mechanical fasteners, similar to Graham Welded Pins, Tuff-Weld nylon hangers or Stic-Klips, shall be used on maximum 12-inch centers at top sections (when width exceeds 12 inches) and on sides (when height exceeds 24- inches); coating shall be exposed to the air stream. All exposed edges and the leading edge of all cross joints of the liner shall be coated with the same adhesive used to secure the duct liner to the metal surface.
- B. Duct Insulation: Insulation shall be installed per insulation written installation instructions. Duct liner shall be adhered to sheet metal and with edges coated with one of the adhesives conforming to Standard for Adhesives for Duct Liner, ASC-A-7001C-1972, OF Adhesive Sealant Council, Inc. Duct liner shall be further secured with fasteners conforming to Mechanical Fastener Standard, MF-111975, on page 22 of Duct Liner Application Standard.
- C. Insulate exposed and concealed kiln exhaust duct with insulation as noted above.

3.07 TAGGING AND IDENTIFICATION

- A. Equipment: Install laminated plastic equipment I.D. tags for all equipment provided. Tags shall be permanently secured to equipment using pop rivets. Engrave identity number of each item of equipment. Coordinate I.D. number designated for each piece of equipment with the room identification provided by the owner.
- B. HVAC Equipment: The following items of new equipment are scheduled on the drawings:
  - 1. Hot water pumps (HWP's)
  - 2. Air-Cooled Chillers (CH's)
  - 3. Hot Water Boilers (B's)
  - 4. Fume Hood Exhaust Fans (FHE's)
  - 5. Laboratory (formaldehyde venting) Exhaust Fans (LEF's)
  - 6. Exhaust fans (EF's)
  - 7. Fan-Coil Units (FC's)
  - 8. Energy Recovery Ventilators (ERV's)
  - 9. Make-Up Air Fan-Coil Units (MUA's)
- C. HVAC Piping and Ductwork: Seton, or equivalent, pressure sensitive labels and directional arrows applied per ANSI A13.1-1981. Apply labels at all valve and damper locations in addition to ANSI requirements. Valves: Seton, or equivalent, 1" diameter brass valve tags with jack chain. Dampers: 1" bakelite nameplates affixed to adjacent ductwork. Provide valve and damper charts in Owner's Operation and Maintenance Manuals.

3.08 TESTS AND BALANCING

- A. All equipment and apparatus necessary for the tests shall be furnished by the Contractor. All defects disclosed by the tests shall be rectified without additional expense.
- B. Heating, Ventilating and Air Conditioning Systems: Provide the services of an approved independent air balancing testing agency to balance, adjust and test all air moving equipment and air distribution and exhausting systems, heating hot and chilled water systems, on both cooling and heating cycles as herein specified. All work shall be done under the direct supervision of a qualified and experienced Heating, Ventilating and Air Conditioning Technician. All instruments used shall be accurately calibrated and maintained in good working order. Agency or Contractor shall be a member of A.A.B.C. or T.A.B.B.
- C. Air balancing and testing shall not begin until system has been completed and is in full working order. All heating, ventilating and air conditioning systems and equipment shall be in full operation and shall continue the operation of same during each working day of testing and balancing. All electrical lighting systems shall be in operation during the testing when room temperatures are recorded.
- D. Air Systems: Upon the completion of the heating, ventilating and air conditioning system, the agency shall perform the following tests and balance each system in accordance with the following requirements:
  - 1. Test and record system supply and return static pressures, at each fan-coil and makeup air fan-coil unit, exhaust fan and energy recovery ventilator.
  - 2. Test and adjust system for design return air, design outside air, and design relief air CFM.
  - 3. Check and record running load amps for all equipment and RPM for all fans.
  - 4. Obtain the assistance of the controls contractor in the balancing of laboratory fume hood exhaust, formaldehyde exhaust and makeup air systems and for laboratory classroom room side pressures.



5. Test and adjust each diffuser, grille, register and air terminal unit to within 5% of design requirements.
  6. All diffusers, grilles and registers shall be adjusted to minimize drafts in all occupied areas.
  7. Make all changes in the pulleys, belts and dampers or the addition of dampers required for correct balance.
- E. Upon completing of balancing and testing insert all information on a sheet listing all items required by specifications and be included in complete test and balance report. Six copies of the testing and balancing report shall be submitted to the Architect for evaluation and approval within 15 days after completion of tests and prior to final acceptance of the project.
- F. The testing agency shall provide a 13 month warranty, effective from date of final contract acceptance of project, during which the testing agency will provide field services to reset areas, change CFM requirements, or adjust conditions not foreseen during design.

3.09 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Provide three sets of written operating, maintenance and lubrication instructions for all installed systems and equipment.
- B. Provide the services of a competent representative to instruct the Owner's representative in the operation of all systems.

END OF SECTION 23 00 00

SECTION 23 09 00  
BUILDING MANAGEMENT SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building Management System (BMS), utilizing direct digital controls.

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.3 Products Supplied But Not Installed Under This Section:

1. Airflow measuring stations.
2. Terminal unit controllers and actuators, when installed by terminal unit manufacturer.

- B. Products Installed But Not Supplied Under This Section:

1. None.

- C. Products Not Furnished or Installed But Integrated with the Work of This Section:

1. VRF, VRV, DOAS control systems, components and BACnet IP interface(s).
2. In-line meters (gas, water, power).

- D. Work Required Under Other Divisions Related to This Section:

1. Power wiring to line side of motor starters, disconnects or variable frequency drives.
2. 120v Power wiring to all control panels. All wiring & conduit above 120v.
3. Provision and wiring of smoke detectors and other devices relating to fire alarm system.
4. Campus LAN (Ethernet) connection adjacent to JACE network management controller.

1.4 SYSTEM DESCRIPTION

- A. Scope: Furnish all labor, materials and equipment necessary for a complete and operating Building Management System (BMS), utilizing Direct Digital Controls as shown on the drawings and as described herein. Drawings are diagrammatic only. All controllers furnished in this section shall communicate on a peer-to-peer bus over the BACnet IP protocol.

1. The existing Imperial Valley College campus DDC System is KMC BACnet IP and CATnet CH-2 BASview Operator Workstation. All DDC Controls shall be furnished and installed by Building Automation Systems, Inc. 858-309-2022.
2. Any OWS software requiring licensing fees or software programming tool ownership fees is SPECIFICALLY PROHIBITED and will be rejected.
3. The intent of this specification is to provide a system consistent with existing KMC BMS system throughout the owner's facilities running the CH-2 BASview Framework.
4. System architecture shall fully support a multi-vendor environment and be able to integrate third party systems via existing vendor protocols including BACnet
5. System architecture shall provide secure Web access using any of the current versions of Microsoft Internet Explorer, Mozilla Firefox, or Google Chrome browsers from any computer on the owner's LAN.
6. All control devices furnished with this Section shall be programmable directly from the EXISTING KMC and CATnet Ch-2 BASview software upon completion of this project. The use of configurable or programmable controllers that require additional software tools or tools that require a specific license brand to operate for post-installation maintenance shall not be acceptable.
7. Any control vendor who provides additional BMS software shall be UNACCEPTABLE. Only systems that utilize the CATnet CH-2 BASview Framework shall satisfy the

- requirements of this section.
8. The BMS server shall host all graphic files for the control system. All graphics and navigation schemes for this project shall match those that are on the existing campus CATnet CH-2 BASview server.
  9. Owner shall receive all Administrator level login and passwords for engineering toolset at first training session. The Owner shall have full licensing and full access rights for all network management, operating system server, engineering and programming software required for the ongoing maintenance & operation of the BMS indefinitely.
  10. All BASview, CH-2 & CATnet hardware SHALL NOT REQUIRE licenses and related certificates.
  11. To ensure quality, all CATnet CH-2 BASview products used on this project shall be provided by Building Automation Systems, Inc. ph:858-309-2022. Hardware products not meeting this requirement WILL NOT be allowed.

## 1.5 SPECIFICATION NOMENCLATURE

- A. Acronyms used in this specification are as follows:
1. Actuator: Control device that opens or closes valve or damper in response to control signal.
  2. AI: Analog Input.
  3. AO: Analog Output.
  4. Analog: Continuously variable state over stated range of values.
  5. BMS: Building Management System.
  6. DDC: Direct Digital Control.
  7. Discrete: Binary or digital state.
  8. DI: Discrete Input.
  9. DO: Discrete Output.
  10. FC: Fail Closed position of control device or actuator. Device moves to closed position on loss of control signal or energy source.
  11. FO: Fail open (position of control device or actuator). Device moves to open position on loss of control signal or energy source.
  12. GUI: Graphical User Interface.
  13. HVAC: Heating, Ventilating and Air Conditioning.
  14. IDC: Interoperable Digital Controller.
  15. ILC: Interoperable Lon Controller.
  16. LAN: Local Area Network.
  17. Modulating: Movement of a control device through an entire range of values, proportional to an infinitely variable input value.
  18. Motorized: Control device with actuator.
  19. NAC: Network Area Controller.
  20. NC: Normally closed position of switch after control signal is removed or normally closed position of manually operated valves or dampers.
  21. NO: Normally open position of switch after control signal is removed; or the open position of a controlled valve or damper after the control signal is removed; or the usual position of a manually operated valve.
  22. OSS: Operating System Server, host for system graphics, alarms, trends, etc.
  23. Operator: Same as actuator.
  24. PC: Personal Computer.
  25. Peer-to-Peer: Mode of communication between controllers in which each device connected to network has equal status and each shares its database values with all other devices connected to network.
  26. P: Proportional control; control mode with continuous linear relationship between observed input signal and final controlled output element.
  27. PI: Proportional-Integral control, control mode with continuous proportional output plus additional change in output based on both amount and duration of change in controller variable (reset control).

28. PICS: BACnet Product Interoperability Compliance Statement.
29. PID: Proportional-Integral-Derivative control, control mode with continuous correction of final controller output element versus input signal based on proportional error, its time history (reset) and rate at which it's changing (derivative).
30. Point: Analog or discrete instrument with addressable database value.
31. WAN: Wide Area Network.

#### 1.6 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- B. Submit documentation of contractor qualifications, including those indicated in "Quality Assurance" if requested by the A-E.
- C. 4 copies of shop drawings of the entire control system shall be submitted and shall consist of a complete list of equipment and materials, including manufacturers' catalog data sheets and installation instructions. Submit in printed electronic format. Samples of written Controller Checkout Sheets and Performance Verification Procedures for applications similar in scope shall be included for approval.
- D. Shop drawings shall also contain complete wiring and schematic diagrams, sequences of operation, control system bus layout and any other details required to demonstrate that the system has been coordinated and will properly function as a system. Terminal identification for all control wiring shall be shown on the shop drawings.
- E. Upon completion of the work, provide 2 complete sets of 'as-built' drawings and other project-specific documentation in 3-ring hard-backed binders and on Flash media.

#### 1.7 QUALITY ASSURANCE

- A. Single Source Responsibility of Supplier: Building Automation Systems, Inc., shall be responsible for the complete installation and proper operation of the control system. Building Automation Systems, Inc. is exclusively in the regular and customary business of design, installation and service of computerized building management systems similar in size and complexity to the system specified. The Control System Contractor shall be the manufacturer of the primary DDC system components or shall have been the authorized representative for the primary DDC components manufacturer for at least 15 years.
- B. Equipment and Materials: Equipment and materials shall be cataloged products of manufacturers regularly engaged in the production and installation of HVAC control systems.

#### 1.8 MANUFACTURERS

- A. KMC Controls & CATnet Systems CH-2 BASview furnished & installed by Building Automation Systems, Inc., 858-309-2022. The existing, campus-wide DDC system is manufactured by KMC and CATnet System Servers and Operator Workstation.
- B. Substitutions: Not permitted.

#### 1.9 GENERAL

- A. The Building Management System (BMS) shall be comprised of a network of interoperable, stand-alone digital controllers, a network area controller, graphics and programming and other control devices for a complete system as specified herein.

- B. The installed hardware & software shall be identical to the existing installed system utilizing the same hardware & software as the existing campus system as installed by Building Automation Systems, Inc., utilizing the existing DDC System network components.

#### 1.10 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURE

- A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system utilizing Open protocols in one open, interoperable system.
- B. Physical connection of any BACnet control equipment, such as VRF systems, shall be via Ethernet or IP. Any VRF BACnet IP interface(s) shall be furnished & installed by others.
- C. All components and controllers supplied under this contract shall be true "peer-to-peer" communicating devices. Components or controllers requiring "polling" by a host to pass data shall not be acceptable. System shall utilize BACnet IP communications.
- D. The supplied system shall incorporate the ability to access all data using HTML5 enabled browsers without requiring proprietary operator interface and configuration programs or browser plug-ins. Servers and data shall reside on the Operating System Server located in Building 400 BMS wall mounted Server Rack on the LAN. Systems requiring proprietary database and user interface programs shall not be acceptable.

#### 1.11 BAS SERVER HARDWARE

- A. Minimum Server Configuration:
  - 1. Central Web Server. Contractor shall provide a dedicated Web Graphics server for each of the (3) buildings in this project. (3) Servers total. Servers by CATnet only.
  - 2. Memory: 1 GB or more recommended for large systems, 8 GB or more recommended for the Windows 64-bit version.
  - 3. Network Support: Ethernet adapter (10/100 Mb with RJ-45 connector).
- B. Standard Client Browser: Windows Chrome, Android: Chrome, iPhone/iPad/Mac: Safari, Linux: Chrome.

#### 1.12 SYSTEM NETWORK CONTROLLER (SNC)

- A. These controllers are designed to manage communications between the programmable equipment controllers (PEC), application specific controllers (ASC) and advanced unitary controllers (AUC) which are connected to its BACnet Ethernet Network, manage communications between itself and other system network controllers (SNC) and with any operator workstations (OWS) that are part of the BAS.
- B. The controllers shall be capable of peer-to-peer communications with other SNC's and with any OWS connected to the BAS, whether the OWS is directly connected, connected via cellular modem or connected via the Internet.
- C. The communication protocols utilized for peer-to-peer communications between SNC's will be BACnet TCP/IP. Use of a proprietary communication protocol for peer-to-peer communications between SNC's is NOT ALLOWED.
- D. The SNC shall be enabled to support and shall be licensed with the following Open protocol drivers (client and server) by default:
  - 1. BACnet
- E. The SNC shall be capable of executing application control programs to provide:
  - 1. Calendar functions.
  - 2. Scheduling.
  - 3. Trending.

4. Alarm monitoring and routing.
  5. Time synchronization.
  6. Integration of BACnet IP, ms/tp, LonWorks, MAMAC & MODBUS controller data.
- F. The SNC shall provide the following hardware features as a minimum:
1. One 10/100 Mbps Ethernet port.
  2. 1 GB SDRAM
  3. USB Flash Drive
  4. Plugin 120V to 24 VAC/DC Power Supply
- G. The SNC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 100 simultaneous users.
- H. The SNC shall provide alarm recognition, storage, routing, management and analysis to supplement distributed capabilities of equipment or application specific controllers.
- I. The SNC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via cellular modem, or wide-area network.
1. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but not limited to:
    - a. Alarm.
    - b. Return to normal.
    - c. To default.
  2. Alarms shall be annunciated in any of the following manners as defined by the user:
    - a. Screen message text.
    - b. Email of complete alarm message to multiple recipients.
    - c. Pagers via paging services that initiate a page on receipt of email message.
    - d. Graphics with flashing alarm object(s).
  3. The following shall be recorded by the SNC for each alarm (at a minimum):
    - a. Time and date.
    - b. Equipment (air handler #, access way, etc.).
    - c. Acknowledge time, date, and user who issued acknowledgement.
- J. Programming software and all controller "Setup Wizards" shall be embedded into the SNC.
- K. The SNC shall employ template functionality. Templates are a containerized set of configured data tags, graphics, histories, alarms... that are set to be deployed as a unit based upon manufacturer's controller and relationships. All lower level communicating controllers (PEC, AUC, AVAV, VFD...) shall have an associated template file for reuse on future project additions.
- L. The SNC shall be provided with a NO COST Software License. NO LICENSING FEES OF ANY KIND IS ACCEPTABLE.

#### 1.13 PROGRAMMABLE EQUIPMENT CONTROLLERS (PEC) BY KMC CONTROLS

- A. General: Controllers shall be responsible for monitoring and controlling directly connected HVAC equipment such as RTUs, HPUs, AHUs, Chillers, Boilers, VAV Terminals, FCU Terminals, Cooling Towers, Pump Systems, and/or other building automation systems as required. Each controller shall be classified as a "native" BACnet device, supporting the BACnet Advanced Application Controllers (B-AAC) profile. Controllers that support a lesser profile such as B-ASC are not acceptable. Controllers shall conform to the BACnet Advanced Application Controller (B-AAC) profile.
- B. Software Specifications
1. General: The controller shall contain non-volatile memory to store both the resident

operating system and application programming. Any program may affect the operation of any other program. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, extraction of the program for storage, routing communications, etc.

2. Automatic Restart after Power Failure: Upon restoration of power after an outage, the controller shall automatically and without human intervention update all monitored functions; resume operation based on current synchronized time and status, and implement special start-up strategies as required.
3. User Programming Language: The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and setpoints. Controllers shall be capable of utilizing both line code based programming and Graphical Function Block programming interfaces.
  - a. Programs shall be generated by an English-language based (line) editor or a Graphical Function Block interface.
  - b. The language shall be structured to allow for the easy configuration of control programs and mathematical calculations.
  - c. Controllers that use non-editable factory programming only method will not be accepted.
4. Energy Management Applications: The controller shall have the ability to perform any or all of the following energy management routines:
  - . Time of Day Scheduling
  - . Calendar Based Scheduling
  - . Holiday Scheduling
  - . Exception Scheduling
  - . Temporary Schedule Overrides
  - . Optimal Start
  - . Optimal Stop
  - . Night Setback Control
  - . Enthalpy Switchover (Economizer)
  - . Temperature Compensated Duty Cycling
  - . CFM Tracking
  - . Demand Ventilation
- C. History Logging: Each controller shall be capable of locally logging any input, output, calculated value, etc. over user defined time intervals (1 second minimum time).
- D. Alarm Management: For each system point, alarms can be created based on high/low limits or conditional expressions. A minimum of 255 priority levels shall be provided. If communication with the Operator Workstation is temporarily interrupted, the alarm will be time-stamped and buffered in the controller. When communications return, the alarm will be transmitted to the Operator Workstation.
- E. Communications: The controllers shall be a native BACnet communications, available as EIA-485 (MS/TP) or Ethernet/IP physical connections as required. The controller shall be capable of communication to both the Workstation(s) and the field buses.
  1. MS/TP Devices: For devices with MS/TP connectivity, baud rates between 9600 and

115.2k baud shall be selectable.

- F. Dedicated Room Sensor Port: The controller shall have a Dedicated Room Sensor port for direct interface to a Digital Room Sensor or Discrete Room Sensor. The controller shall have the ability of detecting if a sensor has been connected to the port and identify its type.
- G. Firmware Upgrades: The controller firmware shall be upgradeable for updates as future enhancements and expanded functionality. Firmware updates shall be supported via BACnet communications (over-the-network) and ALWAYS offered at NO COST.
- H. Hardware Platform Features:
  - 1. Processor: The controller shall employ at minimum a 32-bit microprocessor.
  - 2. Memory: The operating system and the application programs for the controller shall be stored in non-volatile FLASH memory. The controller shall support up to 8 MB Flash memory and up to 2 MB of RAM. The controller shall include an on-board capacitor to back up the controller's RAM memory for a period of at least six hours. In the case of a power failure, the controller shall first try to restart from the RAM memory. If that memory is corrupted or unusable, then the controller shall restart itself from its application program stored in its FLASH memory.
  - 3. Network Communication Ports: The controller shall have on-board, dual 10/100bT Ethernet port or an EIA-485 port. The dual Ethernet connections shall function as an Ethernet hub, allowing daisy-chained Ethernet topologies. The EIA-485 port shall have network protection bulbs and integrated end-of-line (EOL) terminations.
  - 4. Dedicated Room Sensor Port: The controller shall have a dedicated room sensor port to directly connect a Digital Room Sensor or Discrete Room Sensor (supporting both room temperature and room setpoint). Sensors shall be hot-swappable without powering down the controller.
  - 5. Inputs: The controller shall have on-board universal inputs with a minimum of 16-bit analog to digital conversion. Each universal input shall have over-voltage protection. Universal inputs shall have the following integrated, software selectable terminations: 1K pullup, 10K pullup, 0-12VDC, 0-20mA. Each universal input shall be software selectable as analog or binary. Manually set, hardware configuration jumpers shall not be necessary.
  - 6. Outputs: The controller shall have on-board universal outputs with a 12-bit digital to analog conversion. Analog outputs shall be capable of sourcing 100 mA per channel and be short circuit protected. Each universal outputs shall be software selectable as analog or binary.
  - 7. Local Status Indicator Lamps: Provide as a minimum, LED indication of CPU status, Ethernet LAN status, MS/TP LAN Status, and Expansion I/O field bus status. For each output module with an optional override card, provide an LED that gives a visual indication of what state it is in (ON/OFF) and markings to indicate the switch setting (H-O-A).
  - 8. Real Time Clock (RTC): Each controller shall have an integrated real-time clock, accurate to 1.5 minutes per month. The system shall automatically correct for daylight savings time and leap years.
  - 9. Power Supply: The power supply for the controller shall be 24 volts AC (-15%, +20%) power. Voltage below the operating range of the system shall be considered an outage.

#### 1.14 DIGITAL ROOM SENSOR

- A. General: The Digital Room Sensors shall provide the following types of functions and be field programmable:
  - 1. Space condition measurements and indications, including temperature, humidity, local motion/occupancy, and CO2.
  - 2. User setpoint adjustments



3. Equipment status and mode indication
  4. Outside air temperature indication
  5. Capability to view the value of any input or output in the system
  6. Capability to change the value of any input, output or software point in the system
- B. Interface to Controller: The Digital Room Sensor shall connect directly to the controller and shall not utilize any of the hardware I/O points of the controller. The Digital Room Sensor shall be able to be located up to 150' from the controller.
- C. Temporary Network Interface: The Digital Room Sensor shall provide a Temporary Network Interface jack, field accessible without uninstalling the sensor, for connection to the BACnet MS/TP communication trunk to which the BACnet AAC is connected. The Digital Room Sensor, the connected controller, and all other devices on the BACnet network shall be accessible through the temporary communication jack. Microprocessor based sensors whose port only allows communication with the controller to which it is connected shall not be acceptable.
- D. Integrated Sensors: The Digital Room Sensor shall have integrated sensors for temperature, humidity, motion/occupancy, and CO2.
- E. User Indicators: The Digital Room Sensor shall be capable of indicating the following:
1. Fahrenheit, Celsius
  2. CFM, LPS
  3. Fan Status, Fan Speed (Low, Medium, High), Auto Fan, Heat Mode, Cool Mode, Auto Mode, Occupancy Mode, Override Mode
  4. Outside Air Temperature, Part Per Million, %, % Relative Humidity, Time (AM/PM)
  5. Rotational Values – Multiple values may be configured for display in the numeric display fields. If multiple values are configured, the display shall rotate through each point as a configurable rate.
- F. User Setpoints: User/Occupant setpoints may be manipulated via the Digital Room Sensor. Single and/or multiple setpoints shall be supported and field configurable. Unique setpoint sequences shall be configurable and presented to the user based on a mode condition.
- G. Configuration Menus: The Digital Room Sensor shall have configuration menus allowing access to communication and application parameters.
- H. Password Protection: The DIGITAL ROOM SENSOR shall have two levels of password protection: one level to protect user setpoint adjustment, and one level to protect configuration menu parameters. Passwords shall be at least 4 digits in length.

#### 1.15 BACnet ROUTER

- A. General: The BACnet router shall route BACnet traffic between BACnet networks, virtual and/or physical. The router shall be designed for both permanent installations as well as temporary use for BACnet device configuration and BACnet network troubleshooting.

- B. Connections:
1. Power: The router shall be powered wither from 24VAC AC (-15%, +20%) or from USB. The 24VAC connections shall be a removable terminal block accepting 12 to 22 AWG wire.
  2. USB: A micro USB connections shall be provided, supporting both temporary device power and device communications.
  3. Network Communication Ports: The controller shall have an on-board, 10/100bT Ethernet port and an EIA-485 port. The EIA-485 port shall be optically isolated and have integrated end-of-line (EOL) terminations. The EIA-485 port shall be a removable terminal block accepting 12 to 22 AWG wire.
- C. Mounting: The router shall be capable of being flush mounted via mounting holes on 1" centers, or DIN rail, without the use of additional mounting accessories.
- D. Configuration: The router shall be fully configured via integrated HTML5 based webpages, without the need for any specialized or PC based software. The router configuration may be exported to/imported from a local file via the configuration webpages.
- E. Communications: The router shall be a native BACnet device, available as EIA-485 (MS/TP) or Ethernet/IP physical connections as required.
1. MSTP: MSTP network baud rates between shall be selectable between 9600 and 115.2k baud. Segmentation shall be supported.
  2. Ethernet/IP: The following BACnet For devices enabled with Ethernet/IP connectivity, the user shall be able to select BACnet 8802-3, BACnet IP, BACnet BBMD, or BACnet Foreign Device. Segmentation shall be supported.
- F. Routing: The router shall support: one BACnet MSTP network, one BACnet 8802-3 network, and two BACnet IP networks, the IP networks selected able as IP, foreign devices or BBMD. The BBMD Foreign Devices table shall support up to 128 entries.
- G. Diagnostics
1. Device Status: The router shall report the status of each MSTP device that is detected on the MSTP network. MSTP MAC address status shall be indicated with the following color coded categories: no devices detected (white), offline (grey), router MAC (blue), active device (green), errors or duplicate (red). Metrics shall indicate the total device count online, average token cycle time, and the average token time per device.
  2. Token Use: The router shall report state of the MSTP token. The status of the token as it is passed between MSTP devices shall be indicated with the following color-coded categories: passed in less than 100ms (normal, green), passed in more than 100 ms but less than the APDU timeout (slow, yellow), passed in longer than the APDU timeout (red). Poll for Master (PFM) shall be indicated in light blue.
  3. Route Status: The router shall report all the known BACnet networks, both directly connected and remote connected. The status of each BACnet network should be identified, indicating the following network states: active, busy, down/gone, or duplicated network, duplicated MSTP MAC, sole MSTP master, BBMD: Unknown, BBMD: Multiple, Foreign Devices NAK.
- H. Time Master: The router shall be a BACnet time sync master, capable of syncing BACnet network time to either local (PC) or a SNTP Time server. Both UTC and local time shall be

- I. Firmware Upgrades: The router firmware shall be upgradeable for updates as future enhancements and expanded functionality. Firmware updates shall be supported via BACnet communications (over-the-network) and through the integrated configuration webpages.

#### 1.16 OTHER CONTROL SYSTEM HARDWARE

- A. Control damper actuators shall be furnished by the Control System Contractor. Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 5 in-lb torque per square foot of damper area. Damper actuators shall be capacitor-driven fail-safe with switch-selectable direction providing consistent torque in both powered and fail-safe modes. The fail-safe option, on proportional models, can be turned off temporarily for testing purposes or permanently if desired. Damper actuators shall have gear disengagement button, and adjustable mechanical end stop. Proportional models shall include "anti-jitter" circuitry, optional auto-mapping of the full input signal range over a reduced actuator stroke, and switch selectable 0/1–5 or 0/2–10 VDC feedback. Operators shall be heavy-duty electronic type for positioning automatic dampers in response to a control signal. Motor shall be of sufficient size to operate damper positively and smoothly to obtain correct sequence as indicated. All applications requiring proportional operation shall utilize truly proportional electric actuators. KMC & Belimo are acceptable only.
- B. Control Valves: Control valves shall be 2-way or 3-way pattern as shown and constructed for tight shutoff at the pump shut-off head or steam relief valve pressure. Control valves shall operate satisfactorily against system pressures and differentials. Two-position valves shall be 'line' size. Proportional control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (unless otherwise noted or scheduled on the drawings). Valves with sizes up to and including 3 inches shall be "screwed" configuration and 4 inches and larger valves shall be "flanged" configuration. Electrically-actuated control valves shall include capacitor-driven fail-safe actuators with switch-selectable direction providing consistent torque in both powered and fail-safe modes sized for tight shut-off against system pressures (as specified above) and, when specified, shall be furnished with integral switches or positive feedback for indication of valve position. Pneumatic actuators for valves, when utilized, shall be sized for tight shut-off against system pressures (as specified above). KMC is basis of design, Belimo is also acceptable. Alternate manufacturers shall be rejected.
- C. Control Valve Actuators: Actuators for VAV terminal unit heating coils shall be "proportional" type. All actuators shall have inherent current limiting motor protection. Valve actuators shall be 24-volt, electronic type, modulating or two-position as required for the correct operating sequence. Actuators on valves needing 'fail-safe' operation shall have capacitor-driven fail-safe actuators with switch-selectable direction. Modulating valves shall be positive positioning in response to the signal. All valve actuators shall be UL listed. KMC is basis of design. Belimo is also acceptable. Alternate manufacturers shall be rejected.
- D. All hot water control valves shall be Normally-Open arrangement; all chilled water control valves shall be Normally-Closed arrangement. KMC & Belimo is basis of design only.
- E. Non-Digital Wall Mount Room Temperature sensors: Each room temperature sensor shall provide temperature indication to the digital controller, provide the capability for a software-limited occupant set point adjustment (warmer-cooler dial or slider bar) and limited operation override capability. Room Temperature Sensors shall be Type II 10,000-ohm @ 77 degree thermistor type with a temperature range of -40 to 121 degrees F (-38 to 49 degrees C). These devices shall have an accuracy of +/- 0.5 degrees F (.024 degrees C) over the entire range. KMC is basis of design.

- F. Duct-mounted and Outside Air Temperature Sensors: Type III 10,000-ohm @ 77 degree thermistor temperature sensors with an accuracy of  $\pm 0.5$  degrees F (.024 degrees C) over the entire range. Outside air sensors shall include an integral sun shield. Duct-mounted sensors shall have an insertion measuring probe of a length appropriate for the duct size, with a temperature range of -4 to 221 degrees F (-20 to 105 degrees C) The sensor shall include a utility box and a gasket to prevent air leakage and vibration noise. For all mixed air and preheat air applications, install bendable averaging duct sensors with a minimum 6 feet long sensor element. These devices shall have accuracy of  $\pm 0.5$  degrees F (.024 degrees C) over the entire range. KMC is basis of design.
- G. Humidity sensors shall be a CMOS chip sensor providing excellent linearity, sensitivity, and reliability, accuracy to plus or minus two percent (2%) over the 10 to 90% RH, 10 - 15 VDC input voltage, analog output (0 – 5 VDC output). Operating range shall be 0 to 100% RH and 40 to 120 degrees F (4 to 49 degrees C). Sensors shall be selected for wall, duct or outdoor type installation as appropriate. KMC is basis of design.
- H. Carbon Dioxide Sensors (CO<sub>2</sub>): NDIR (Non-Dispersive Infrared) sensor, single beam with a patented self-calibration algorithm. Five year calibration guarantee (in auto-calibration mode), in compliance with CA Title 24, Section 121(c). Sensor default range shall be 0 - 2000 PPM but configurable up to 7,500 PPM. Accuracy shall be plus or minus 75 PPM @ 1000PPM @ 72 Degrees Fahrenheit. Response shall be less than two minutes. Input voltage shall be 20 to 28 VAC or DC. Choice of field-adjustable analog current or voltage output signals (4–20 mA, 0–5 VDC, or 0–10 VDC), linearized over full range. Sensor shall be wall or duct mounted type, as appropriate for the application, housed in a high impact plastic enclosure. KMC is basis of design.
- I. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.
- J. Differential Analog (duct) Static Pressure Transmitters: Provide a pressure transmitter with six switch-selectable pressure ranges (inches water column or pascals). Accuracy shall be plus or minus 1% of full scale range. Provide push button auto zero capability. Device shall have integral static pickup tube. Device shall have three switch-selectable voltage/current outputs of 4–20 mA (2-wire), 0–5 VDC (3-wire), or 0–10 VDC (3-wire). Powered by 20 to 28 VAC or VDC. KMC & MAMAC & VERIS are allowed.
- K. Differential Air Pressure Switches: Provide SPDT type, UL-approved, and selected for the appropriate operating range where applied. Switches shall have adjustable set points and barbed pressure tips or compression fittings.
- L. Water Flow Switches: Provide a SPST type contact switch with bronze paddle blade, sized for the actual pipe size at the location. If installed outdoors, provide a NEMA-4 enclosure. Flow switch shall be UL listed.
- M. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. All electrical devices within a control panel shall be factory wired. Control panel shall be assembled by the BMS in a UL-Certified 508A panel shop. A complete set of 'as-built' control drawings (relating to the controls within that panel) shall be furnished within each control panel.
- N. Pipe and Duct Temperature sensing elements: Type III 10,000 ohm thermistor encapsulated temperature sensors with an accuracy of  $\pm 0.36$  Degrees F ( $\pm 0.20$  Degrees C). Their range shall be -4 to 221 degrees F (-20 to 105 degrees C). Thermal wells with heat conductive gel shall be included. KMC is basis of design.

- O. Low Air Temperature Sensors: Provide SPDT type switch, with 34 to 70 degrees F (1.1 to 21 degrees C) range, vapor-charged temperature sensor. KMC model CTE-3017, or approved equivalent.
- P. Variable Frequency Drives: The variable frequency drive (VFD) shall be designed specifically for use in Heating, Ventilation, and Air Conditioning (HVAC) applications in which speed control of the motor can be applied. The VFD, including all factory installed options, shall have UL & CSA approval. VFD's shall include communications capability with DDC BMS via built-in interface card (BACnet). Typically furnished by the Mechanical Contractor.
- Q. Relays: Start/stop relay model shall provide either momentary or maintained switching action as appropriate for the motor being started. All relays shall have indicating lamp. Relays installed outside of controlled devices shall be enclosed in a NEMA enclosure suitable for the location. Relays shall be labeled with UR symbol. RIB-style relays are acceptable for remote enable/disable.

#### 1.17 BAS SERVER & CATnet BASview CH-2 WEB BROWSER GUI - SYSTEM OVERVIEW

- A. The BAS Contractor shall provide system software based on server/thin-client architecture, designed around the open standards of web technology. The BAS server shall communicate using Ethernet and TCP. Server shall be accessed using a web browser over Owner intranet and remotely over the Internet. Server shall be manufactured by CATnet CH-2 BASview.
- B. The intent of the thin-client architecture is to provide the operator(s) complete access to the BAS system via a web browser. The thin-client web browser Graphical User Interface (GUI) shall be browser and operating system agnostic, meaning it will support HTML5 enabled browsers without requiring proprietary operator interface and configuration programs or browser plug-ins. Microsoft, Firefox, and Chrome browsers (current released versions), and Windows as well as non-Windows operating systems.
- C. The web browser GUI shall provide a completely interactive user interface and shall provide a HTML5 experience that supports the following features as a minimum:
  - 1. Trending.
  - 2. Scheduling.
  - 3. Electrical demand limiting.
  - 4. Duty Cycling.
  - 5. Downloading Memory to field devices.
  - 6. Real time 'live' Graphic Programs.
  - 7. Tree Navigation.
  - 8. Parameter change of properties.
  - 9. Set point adjustments.
  - 10. Alarm / event information.
  - 11. Configuration of operators.
  - 12. Execution of global commands.
  - 13. Add, delete, and modify graphics and displayed data.

#### 1.18 WEB BROWSER GRAPHICAL USER INTERFACE

- A. Web Browser Navigation: The Thin Client web browser GUI shall provide a comprehensive user interface. Using a collection of web pages, it shall be constructed to "feel" like a single application, and provide a complete and intuitive mouse/menu driven operator interface. It shall be possible to navigate through the system using a web browser to accomplish requirements of this specification. The Web Browser GUI shall (as a minimum) provide for navigation, and for display of animated graphics, schedules, alarms/events, live graphic programs, active graphic set point controls, configuration menus for operator access, reports and reporting actions for events. All graphics shall 100% replicate the existing system in functionality, 3-D displays and operation.

- B. Login: On launching the web browser and selecting the appropriate domain name or IP address, the operator shall be presented with a login page that will require a login name and strong password. Navigation in the system shall be dependent on the operator's role-based application control privileges.
- C. 3-D Color Graphics: The Web Browser GUI shall make extensive use of color in the graphic pane to communicate information related to set points and comfort. Graphics tools used to create Web Browser graphics shall be non-proprietary.
  - 1. 3-D Color Floor Plans: Floor plan graphics shall show heating and cooling zones throughout the buildings in a range of colors. Provide a visual display of temperature relative to their respective set points.
  - 2. Mechanical Components: Mechanical system graphics shall show the type of mechanical system components serving any zone through the use of a pictorial representation of components. Selected I/O points being controlled or monitored for each piece of equipment shall be displayed with the appropriate engineering units. Animation shall be used for rotation or moving mechanical components to enhance usability.
- D. Hierarchical Schedules: Utilizing the Navigation Tree displayed in the web browser GUI, an operator (with proper access credentials) shall be able to define a Normal, Holiday or Override schedule for an individual piece of equipment or room, or choose to apply a hierarchical schedule to the entire system, site or floor area.
  - 1. Schedules: Schedules shall comply with the BACnet standards, (Schedule Object, Calendar Object, Weekly Schedule property and Exception Schedule property) and shall allow events to be scheduled based on:
    - a. Types of schedule shall be Normal, Holiday or Override.
    - b. A specific date.
    - c. A range of dates.
    - d. Any combination of Month of Year (1-12, any), Week of Month (1-5, last, any), Day of Week (M-Sun, Any).
    - e. Wildcard (example, allow combinations like second Tuesday of every month).
- E. Alarms: Alarms associated with a specific system, area, or equipment selected in the Navigation Tree, shall be displayed in the Alarm Pane by selecting an ' Alarms' view. Alarms, and reporting actions shall have the following capabilities:
  - 1. Alarms View: Each Alarm shall display an Alarms Category, date/time of occurrence, current status, alarm report and a link to the associated graphic for the selected system, area or equipment.
  - 2. Alarm Time/Date Stamp: All events shall be generated at the DDC control module level and comprise the Time/Date Stamp using the standalone control module time and date.
  - 3. Alarm Reporting Actions: Alarm Reporting Actions specified shall be automatically launched (under certain conditions) after an Alarm is received by the BAS server software. Reporting Actions shall be as follows:
    - a. Print: Alarm information shall be printed to the BAS server's PC or a networked printer.
    - b. Email: Email shall be sent via compatible e-mail server. Email messages may be copied to several email accounts.
- F. Trends: As system is engineered, all points shall be enabled to trend. Trends shall both be displayed and user configurable through the Web Browser GUI. Trends shall comprise analog, digital or calculated points simultaneously. A trend log's properties shall be editable using the Navigation Tree and Graphic Pane.
  - 1. Viewing Trends: The operator shall have the ability to view trends by using the

Navigation Tree and selecting a Trends button in the Graphic Pane.

2. Local Trends: Trend data shall be collected locally by Multi-Equipment/Single Equipment general-purpose controllers, and periodically uploaded to the BAS server if historical trending is enabled for the object. Systems that rely on a gateway/router to run trends are NOT acceptable.
  3. Zoom/Pan. It shall be possible to zoom-in on a particular section of a trend for more detailed examination and 'pan through' historical data by simply scrolling the mouse.
- G. Security Access: Systems that Security access from the web browser GUI to BAS server shall require a Login Name and Strong Password.

## PART 2 EXECUTION

### 2.1 GENERAL

- A. Line and low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by the Control System Contractor in accordance with these specifications. VRF System control wiring furnished by others.
- B. Equipment furnished by the Mechanical Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by Building Automation Systems, Inc. 858-309-2022.

### 2.2 WIRING

- A. All low voltage electrical control wiring to the control panels shall be the responsibility of the Control System Contractor. All high voltage (120v or higher) furnished & installed by others.
- B. All wiring shall be in accordance with the Project Electrical Specifications (Division 26), the National Electrical Code and any applicable local codes. All control wiring shall be installed in raceways were exposed to damage. Plenum rated cabling allowed in concealed, accessible areas.
- C. Campus standard DDC System color coded wiring is required.
- D. Use manufacturer-specified wire for all network connections.

### 2.3 ACCEPTANCE TESTING

- A. Upon completion of the installation, the Control System Contractor shall load all system software and start-up the system. The Control System Contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.
- B. System Acceptance: Satisfactory completion is when the Control System Contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

### 2.4 OPERATOR TRAINING

- A. During system commissioning and at such time acceptable performance of the Control System hardware and software has been established, the Control System Contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

- B. The Control System Contractor shall provide 16 total hours of training for system orientation, product maintenance and troubleshooting, programming and engineering.

## 2.5 WARRANTY PERIOD SERVICES

- A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.
- B. Within this period, upon notice by the Owner, any defects in the BMS due to faulty materials, methods of installation or workmanship shall be promptly repaired or replaced by the Control System Contractor at no expense to the Owner.
- C. Maintenance of Computer Software Programs: The Control System Contractor shall maintain all software during the standard first year warranty period. In addition, all factory or sub-vendor upgrades to software during the first year warranty period shall be added to the systems, when they become available, at no additional cost. In addition to first year standard warranty. NO SOFTWARE MAINTENANCE FEES OR AGREEMENTS NECESSARY FOR AN INDEFINITE TIME PERIOD. All SNC and BAS Servers are included in this coverage.
- D. Maintenance of Control Hardware: The Control System Contractor shall inspect, repair, replace, adjust, and calibrate, as required, the controllers, control devices and associated peripheral units during the warranty period.
- E. Service Period: Calls for service by the Owner shall be addressed either remotely or on-site within 24 hours and are not to be considered as part of routine maintenance.

## 2.6 OPERATION & MAINTENANCE MANUALS

- A. See Division 1 for requirements. O&M manuals shall include the following elements, as a minimum:
  - 1. As-built control drawings for all equipment.
  - 2. As-built Network Communications Diagram.
  - 3. General description and specifications for all components.
  - 4. Completed Controller Checkout/Calibration Sheets.

END OF SECTION



SECTION 23 09 13 INSTRUMENTATION AND CONTROL DEVICES FOR HVAC  
BACNET FACILITY MANAGEMENT AND CONTROL SYSTEM (FMCS)

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, equipment, and service necessary for a complete and operating Facility Management and Control System (FMCS), utilizing Direct Digital Controls as shown on the drawings and as described herein. The FMCS Contractor scope shall include the Phoenix Laboratory Controls as provided by Newmatic Engineering (no known equal). The Phoenix Fume Hood Control system specification is integrated with this specification section. The FMCS shall be capable of total integration of the facility infrastructure systems with user access to all system data either locally over a secure Intranet within the building or by remote access by a standard Tridium product Web Browser over the Internet. This shall include HVAC control, laboratory fume hood controls, energy management, alarm monitoring and all trending functions related to normal building operations all as indicated on the drawings or elsewhere in this specification. All controllers described herein shall be 100% BTL certified; no exceptions.
- B. All labor, material, equipment and software not specifically referred to herein or on the plans, but are required to meet the functional intent of this specification, shall be provided without additional cost to the Owner.
- C. Scope of Work: Provide all labor, materials, programming and supervision necessary to install a Direct Digital control system (DDC) integrated with the Phoenix Fume Hood Control System via BACnet.
  - 1. The scope of work shall include but not be limited to the following:
    - a. Scope shall include all costs associated with furnishing and installing a Phoenix Fume Hood Control System as provided by Newmatic Engineering, Richard Yardley 858-442-8500.
    - b. Scope shall include all costs associated with providing a turn-key, Native BACnet DDC HVAC Control System integrated with the Phoenix Control System via BACnet.
    - c. All HVAC DDC controllers shall be certified by the BACnet Testing Laboratories (BTL).
  - 2. The Control Contractor shall furnish all electrical control and interlock wiring connected to the controls and instrumentation systems. 110 VAC or greater voltage power wiring to main control panels (i.e. AHU's) as shown on the mechanical plans and/or specifications, shall be provided by Division 16 Contractor (Electrical), and coordinated with this Contractor. Control power to operate Fan Coils shall be the responsibility of division 16000 as indicated on Control details.
  - 3. All conduits in connection with the controls and instrumentation system shall be furnished and installed by this Contractor.
  - 4. Provide a comprehensive operator and technician-training program as described herein.
  - 5. Provide as-built documentation, software, and all DDC control logic and all associated support documentation on approved media, which accurately represents the final installed system.
- D. Related Work not in this Section:
  - 1. Division 16, Electrical:

- a. Providing motor starters and disconnect switches (unless otherwise noted).
- b. Power wiring and conduit (unless otherwise noted).
- c. Provision, installation and wiring of smoke detectors (unless otherwise noted).

#### 1.02 SUBMITTALS

- A. Eight copies of shop drawings of the entire control system including the Fume Hood Control System shall be submitted and shall consist of a complete list of equipment and materials, including manufacturers catalog data sheets and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams, software descriptions, calculations, and any other details required to demonstrate that the system has been coordinated and will properly function as a system. Terminal identification for all control wiring shall be shown on the shop drawings. A complete written Sequence of Operation as well as a hard copy graphical depiction of the application control programs shall also be included with the submittal package.
- B. Upon completion of the work, provide a complete set of 'as-built' drawings and application software on magnetic floppy disk media or compact disk. Drawings shall be provided as AutoCAD™ or Visio™ compatible files. Eight copies of the 'as-built' drawings shall be provided in addition to the documents on magnetic floppy disk media or compact disk.

#### 1.03 QUALITY ASSURANCE

- A. The Manufacturer of the FMCS digital controllers shall provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing). Product literature provided by the FMCS digital controller manufacturer shall contain the ISO-9001 Certification Mark from the applicable registrar.
- B. Coordination:
  1. The Control Contractor shall supply the control valves, immersion wells and couplings for flow and pressure switches to the Mechanical Contractor for installation.
  2. The Control Contractor shall supply and install control damper actuators. The Mechanical Contractor is responsible for providing and installing automatic control dampers and blank-off plates if needed.

#### 1.04 JOB CONDITIONS

- A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to insure that the work will be carried out in an orderly fashion.

#### 1.05 QUALIFICATION OF BIDDERS

- A. All bidders must be temperature control contractors in the business of installing direct digital temperature controls for over twenty (20) years. Contractors with less than 10 years experience shall submit qualifications and project submittals to the Engineer 30 days prior to bid date for approval to bid.
- B. All bidders must be manufacturers or licensed factory representatives and installers of the manufacturers specified for the local area. Bidders must also be a Certified Systems Integrator for the BACnet and Tridium products specified. Phoenix Fume Hood Controls shall be provided by Newmatic Engineering, Richard Yardley: 858-442-8500.
- C. All bidders shall have a local engineering and service office with at least 10 existing, installed customers within 15 miles of the job site.

D. Acceptable DDC Control products:

1. Native BACnet by Control Contractors Inc. 858-554-1814
2. Siemens BACnet Controls (Proprietary Apogee excluded)

1.06 WARRANTY AND WARRANTY ACCESS

- A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.
- B. The Owner shall grant to the Temperature Control sub-contractor, reasonable access to the FMCS during the warranty period. The owner shall allow the contractor to access the FMCS from a remote location for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period.

1.07 SYSTEM DESCRIPTION

- A. The entire Native BACnet Facility Management and Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers communicating on an open protocol communication network to a host computer within the facility and communicating via the internet to a computer with standard browser in a remote location. The FMCS shall be capable of communicating with third party systems such as chillers, boilers, air handling systems, energy metering systems, other energy management systems, access control systems, fire-life safety systems and other building management related devices with open, interoperable communication capabilities.
- B. The basic controls system also includes all Fume Hood Controls by Phoenix, sensors, controllers, instruments, valves, actuators, devices, installation and service for a complete and functional controls system. All control devices (valves, actuators, etc.) are included under the ATC contract unless specifically specified elsewhere in this document or in the HVAC Specification. Control system shall be designed to allow easy field adjustment of all set points and parameters.

1.08 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. This specification defines the minimum equipment and performance requirements for an interoperable Building Automation System (BAS).
- B. The drawings are diagrammatic intending to show a workable general arrangement and location of components and are not necessarily complete or rigid in all details.

1.09 AGENCY AND CODE APPROVALS

- A. All products of the FMCS shall be provided with the following agency approvals. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Systems or products not currently offering the following approvals are not acceptable.
  1. BACnet Testing Laboratory certification for all controllers (BTL Certified).
  2. UL-916; Energy Management Systems
  3. FCC, Part 15, Subpart J, Class A Computing Devices

1.10 SOFTWARE LICENSE AGREEMENT

- A. The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract.

PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers, a computer system, graphical user interface software, portable operator terminals, printers, network devices and other devices as specified herein.
- B. The installed system shall provide secure password access to all features, functions and data contained in the overall FMCS.

## 2.02 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

- A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate both the ANSI/ASHRAE Standard 135-2004 BACnet.
- B. All components and controllers supplied under this contract shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.
- C. The supplied system must incorporate the ability to access all data using an internet browser without requiring proprietary operator interface and configuration programs. Systems requiring proprietary database and user interface programs shall not be acceptable.
- D. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal Intranet network. Systems employing a “flat” single tiered architecture shall not be acceptable.

## 2.03 BUILDING CONTROLLER (BC)

- A. General: Building Controllers shall combine both network routing functions and control functions into a single unit. BC’s shall route communications between the BACnet/IP network, the BACnet 8802.3 network, BACnet PTP network and the BACnet MS/TP network. The BC shall be responsible for monitoring and controlling directly connected HVAC equipment such as large AHU’s, Chillers or Boilers. Controllers that support a lesser profile such as B-AAC are not acceptable. BC’s shall be tested and certified by the BACnet Testing Laboratory (BTL) as Building Controllers (B-BC).
- B. Hardware Specifications:
  - 1. Memory: The operating system and the application programs for the BC shall be stored in non-volatile FLASH memory.
  - 2. Communication Ports: Each BC shall provide communication to both the Workstation(s) and the field buses. The BC shall have on-board a 10/100bT Ethernet port, an RS-232 Port and two RS-485 ports.
  - 3. Modular Expandability: The system shall employ a modular I/O field interface (sensors, actuators, etc.) design to allow easy expansion of the field interface device Input and Output capacity. It shall be possible to add I/O modules as desired to meet the I/O requirements for individual control applications. These modules shall be capable of being installed up to 100 feet from the BC
  - 4. Inputs: The BC shall have 16 on-board universal inputs with a minimum of 12-bit analog to digital conversion. Each input shall have over-voltage protection.
  - 5. Outputs: The BC shall have 16 on-board universal outputs with a 12-bit digital to analog conversion. Each output shall have optional three position manual override switches to allow selection of the ON, OFF, or AUTO output state. These switches shall provide feedback to the controller so that the Auto or non-Auto position of the override switch can be obtained through software.

- a. Optional output cards all with Hand-Off-Auto switches and switch feedback for the following outputs:
  - 1) 24 VAC Zero crossing Triac
  - 2) N.C. Form A relay output
  - 3) N.O. Form A relay output
  - 4) 4-20ma with override potentiometer
  - 5) 0-10VDC analog output with override potentiometer
6. Local Status Indicator Lamps: Provide as a minimum, LED indication of CPU status, Ethernet LAN status, and field bus status.
7. Real Time Clock (RTC): Each BC shall include a battery or capacitor backed, real time clock for 72 hours, accurate to 1.5 minutes per month.
8. Automatic Restart after Power Failure: Upon restoration of power after an outage, the BC shall automatically and without human intervention.
9. Battery backup: The BC shall include an on-board battery to back up the controller's RAM memory.
- C. History Logging: Each controller shall be capable of locally logging any input, output, calculated value, etc. over user defined time intervals (1 second minimum time). Up to 256 values shall be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.
- D. Alarm Management: For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan of the BC and can result in the display of one or more alarm messages or reports. Up to 8 alarms can be configured for each point in the controller. Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided. If communication with the Operator Workstation is temporarily interrupted, the alarm will be time-stamped and buffered in the BC. When communications return, the alarm will be transmitted to the Operator Workstation.
- E. Router Function: The BC shall be capable of routing traffic between two BACnet MS/TP ports, one BACnet PTP (Point to Point) port, four (logical) BACnet IP ports and one (logical) BACnet Ethernet port.
- F. Each BC shall have the following standard features:
  1. Each of the four BACnet IP ports can be configured for BACnet IP, BBMD, Foreign Device Registration, or PAD.
  2. The Firmware shall be upgradeable through the Ethernet connection via FTP without physical access to the BC for easy updates as future enhancements expand functionality.
  3. 16 on-board universal inputs and 16 on-board universal outputs, software selectable as either analog or binary.
  4. Accept up to seven expansion I/O cards.
  5. Expansion I/O modules shall be connected with twisted pair wire up to 100 feet from the B-BC.
  6. Shall dynamically allocate memory resources to provide flexible use of its memory.
  7. Shall contain up to 32 user defined control programs.
  8. Shall employ at minimum a 32-bit microprocessor.
  9. Shall meet or exceed the specifications in the ANSI/ASHRAE BACnet Standard 135-2004 for BACnet Building Controllers.
  10. Shall have removable screw terminal blocks that can accommodate wire sizes 14-22 AWG.
  11. Shall support pulse counting up to 16 Hz.
  12. Shall support direct connections up to 128 inputs, 72 outputs and 128 accumulator objects.

13. Shall support up to 1000 Analog Value Objects, 1000 Binary Value Objects and up to 256 Multi-state Value Objects.
14. Shall support up to 32 Loop Objects.
15. Shall support up to 32 Program Objects.
16. Shall support up to 32 Schedule Objects and up to 32 Calendar Objects.
17. Shall support up to 256 Trend Objects.

#### 2.04 INTEROPERABLE BACnet CONTROLLER (IBC)

- A. Controls shall be microprocessor based BACnet Advanced Application Controllers (AAC) in accordance with the ANSI/ASHRAE Standard 135-2004. The Native BACnet AAC's shall be provided for Air Handling Units, Chilled and Hot Water Control, Fan Coils and other applications as shown on the drawings. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals. The system supplier must provide a PICS document showing the installed systems compliance level to the ANSI/ASHRAE Standard 135-2004.
- B. All Native BACnet AAC's shall be fully application programmable and shall at all times maintain their BACnet compliance. Controllers offering application selection only (non-programmable) are not acceptable. All control sequences within or programmed into the BACnet AAC's shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.
- C. Whether stand-alone or networked, the BTL Listed Advanced Application Controllers shall be used to provide direct digital control of HVAC equipment. In addition to their standalone capabilities to execute the operating sequences described later in this document, they shall also be capable to be networked in a peer-to-peer, BACnet MS/TP field network to other BACnet AAC's, or as part of a complete facilities management system which integrates multiple field networks. These controllers may be used to optimize the energy consumption by implementing various Energy Management strategies such as demand limiting, duty cycling, outside air optimization, temperature setup/setback, optimum start/stop routines, etc.
  1. Standard features for all field devices features shall include:
    - a. Stand-alone or networked peer-to-peer capabilities as MS/TP Masters; slave devices are not acceptable.
    - b. BACnet MS/TP LAN with configurable baud rate from 9600 to 76.8k baud.

#### 2.05 MICROPROCESSOR BASED LCD Display SPACE (MBS) SENSOR

- A. The MBS Sensor shall connect directly to the BACnet AAC's and shall not utilize any of the I/O points of the controller. The MBS Sensor shall provide a communication connection to the controller. The MBS Sensor shall provide a communications jack for connection to the BACnet communication trunk to which the BACnet AAC is connected. The MBS Sensor, the connected controller, and all other devices on the BACnet bus shall be accessible by the Portable Operator's Terminal (POT). Microprocessor based sensors whose port only allows communication with the controller to which it is connected shall not be acceptable.

## 2.06 OTHER CONTROL SYSTEM HARDWARE

- A. Control Damper Actuators: Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 5 in-lb torque per square foot of damper area. Damper actuators shall be spring return type. Provide one actuator per damper minimum.
- B. Control Valves: Control valves shall be 2-way or 3-way pattern as shown constructed for tight shutoff and shall operate satisfactorily against system pressures and differentials. Two-position valves shall be 'line' size. Proportional control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Valves with sizes up to and including 2 inches shall be "screwed" configuration and 2-1/2 inch and larger valves shall be "flanged" configuration. Electrically controlled valves shall include spring return type actuators sized for tight shut-off against system pressures and furnished with integral switches for indication of valve position (open-closed).
- C. Duct Mount, Pipe Mount and Outside Air Temperature Sensors: 10,000-ohm thermistor temperature sensors with an accuracy of  $\pm 0.2^{\circ}\text{C}$ . Outside air sensors shall include an integral sun shield.
- D. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the temperature control system manufacturer or its exclusive factory authorized installing contracting field office (representative). The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in submittal package verifying longevity of the installing company's relationship with the manufacturer. Supervision, calibration and checkout of the system shall be by the employees of the local exclusive factory authorized temperature control contracting field office (branch or representative).
- B. Drawings of temperature control systems are diagrammatic only and any apparatus not shown, such as relays, accessories, etc., but required to make the system operative to the complete satisfaction of the Architect shall be furnished and installed without additional cost.

### 3.02 WIRING

- A. All electrical control wiring and power wiring to the control panels shall be the responsibility of the FMCS contractor.
- B. The electrical contractor (Div. 16) shall furnish all power wiring to electrical starters and motors.
- C. All wiring shall be in accordance with the Project Electrical Specifications (Division 16), the National Electrical Code and any applicable local codes. All FMCS wiring shall be installed in the conduit types specified in the Project Electrical Specifications (Division 16) unless otherwise allowed by the National Electrical Code or applicable local codes. Where FMCS plenum rated cable wiring is allowed it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.

3.03 ACCEPTANCE TESTING

- A. Upon completion of the installation, the Temperature Control sub-contractor shall load all system software and start-up the system. The Temperature Control sub-contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.
- B. Upon completion of the performance tests described above, repeat these tests in presence of Owner's Representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owner's Representative.
- C. System Acceptance: Satisfactory completion is when the Temperature Control sub-contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative.

3.04 OPERATOR INSTRUCTION, TRAINING

- A. During system commissioning and at such time acceptable performance of the FMCS hardware and software has been established the Temperature Control sub-contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.
  - 1. The Temperature Control sub-contractor shall provide 40 hours of instruction to the owner's designated personnel on the operation of the FMCS and describe its intended use with respect to the programmed functions specified.

**PART 4 - LABORATORY AIR FLOW GUIDE SPECIFICATION (PHOENIX CONTROLS)**

Part 1.0 General

1.01 Description:

- A. A laboratory airflow control system shall be furnished and installed to control the airflow into and out of laboratory rooms with fume hoods. The exhaust flow rate of a laboratory fume hood shall be controlled precisely to maintain a constant average face velocity into the fume hood. The laboratory control system shall vary the amount of supply air into the room to operate the laboratories at the lowest possible airflow rates necessary to maintain laboratory pressurization in relation to adjacent spaces (negative). The laboratory airflow control system shall be integrated with the Building Management System (BMS).

1.02 Acceptable Manufacturers

- A. The plans and specifications for the laboratory airflow control system are based on systems and equipment manufactured by Phoenix Controls Corporation.
- B. Only those systems specifically named in this specification or by addendum shall be considered for approval. Other systems submitted after the bid opening will be returned without review.



1.03 Warranty Period

- A. Warranty shall commence upon the date of shipment and extend for a period of 36 months, whereupon any defects in materials or laboratory airflow control system performance shall be repaired by the supplier at no cost to the owner.

Part 2.0 System Performance Requirements / System Components

2.01 Airflow Control System Description

- A. Each laboratory shall have a dedicated laboratory airflow control system.
- B. The laboratory airflow control system shall employ individual average face velocity controllers that directly measure the area of each fume hood's sash opening and proportionally control each hood's exhaust airflow to maintain a constant face velocity over a minimum range of 20% to 100% of sash travel. The corresponding minimum hood exhaust flow turndown ratio shall be 5 to 1.
- C. The hood exhaust airflow control device shall respond to the fume hood sash opening by achieving 90% of its commanded value within one second of the sash reaching 90% of its final position (with no more than 5% overshoot/undershoot) of required airflow. Rate of sash movement shall be from one to one and one-half feet per second.
- D. The hood exhaust airflow control device shall be switched to a decommissioned mode when class is over. This mode shall be initiated from the fume hood monitor or through the BMS network. In this mode, the exhaust valve is brought to its physical minimum of 90 CFM. The mode is exited automatically when the sash is opened.
- E. The laboratory airflow control system shall maintain specific airflow ( $\pm 5\%$  of signal within one second of a change in duct static pressure) regardless of the magnitude of the pressure change, airflow change or quantity of airflow control devices on the manifold (within 0.3" to 3.0" wc).
- F. The laboratory airflow control system shall use volumetric offset control to maintain room pressurization. The system shall maintain proper room pressurization polarity regardless of any change in room/system conditions, such as the raising and lowering of any or all fume hood sashes or rapid changes in duct static pressure. Systems using differential pressure measurement or velocity measurement to control room pressurization are unacceptable.

2.02 Airflow Control Device—General

- A. The airflow control device shall be a field proven venturi valve.
- B. The airflow control device shall be pressure independent over its specified differential static pressure operating range. An integral pressure independent assembly shall respond and maintain specific airflow within one second of a change in duct static pressure irrespective of the magnitude of pressure and/or flow change or quantity of airflow controllers on a manifolded system.
- C. The airflow control device shall maintain accuracy within  $\pm 5\%$  of signal over an airflow turndown range of no less than 16 to 1.
- D. No minimum entrance or exit duct diameters shall be required to ensure accuracy and/or pressure independence.
- E. The airflow control device shall be constructed of 16-gauge aluminum. The device's shaft and shaft support brackets shall be made of 316 stainless steel. The pivot arm and internal mounting link shall

be made of aluminum (for supply air) or 316 or 303 stainless steel (for fume hoods or formaldehyde exhaust). The pressure independent springs shall be a spring-grade stainless steel. All shaft bearing surfaces shall be made of a Teflon, polyester or PPS (polyphenylene sulfide) composite. Fume hood or formaldehyde exhaust valves shall have a baked-on, corrosion-resistant phenolic coating. The device's shaft shall be made of 316 stainless steel with a Teflon coating. The internal nuts, bolts and rivets shall be stainless steel.

- F. Actuation –a UL 916 listed electronic actuator shall be factory mounted to the valve. Loss of main power shall cause the valve to position itself in an appropriate failsafe state.
- G. The controller for the airflow control devices shall be microprocessor based and operate using peer-to-peer control architecture. The room-level airflow control devices shall function as a standalone network.
- H. There shall be no reliance on external or building-level control devices to perform room-level control functions. Each laboratory control system shall have the capability of performing fume hood control and room pressurization control, and implement occupancy and emergency mode control schemes.
- I. The laboratory airflow control systems shall be integrated with the BMS via BACnet.
- J. Certification:
  - a. Each airflow control device shall be factory calibrated to the job specific airflows as detailed on the plans and specifications using NIST traceable air stations and instrumentation having a combined accuracy of no more than  $\pm 1\%$  of signal over the entire range of measurement. Electronic airflow control devices shall be further calibrated and their accuracy verified to  $\pm 5\%$  of signal at a minimum of 48 different airflows across the full operating range of the device.
  - b. Each airflow control devices shall be marked with device-specific factory calibration data. At a minimum, it should include the tag number, serial number, model number, eight-point characterization information (for electronic devices), and quality control inspection numbers. All information shall be stored by the manufacturer for use with as-built documentation.

#### 2.03 Sash Sensing and Monitoring Equipment for VAV Fume Hoods

- A. For variable air volume (VAV) fume hood exhaust systems, a sash sensor shall be provided to measure the height of each vertically moving fume hood sash. A sash sensor shall also be provided for horizontal overlapping sashes. Control systems employing sidewall-mounted velocity sensors shall be unacceptable.
- B. The airflow at the fume hood shall vary in a linear manner between two adjustable minimum and maximum flow set points to maintain a constant face velocity throughout this range. A minimum volume flow shall be set to assure flow through the fume hood even with the sash totally closed.
- C. A fume hood monitor shall be provided to receive the sash sensor output and de-commissioning input. This same monitor shall generate an exhaust airflow control signal for the appropriate airflow control device in order to provide a constant average face velocity. Audible and separate visual alarms shall be provided for both flow alarm and emergency exhaust conditions.

2.04 Control Functions

- A. The airflow control devices shall utilize peer-to-peer, distributed control architecture to perform room-level control functions. Master-slave control schemes shall not be acceptable. Control functions shall include, at a minimum, pressurization control, as well as respond to occupancy and emergency control commands.
- B. Pressurization Control
  - 1. The laboratory control system shall control supply and auxiliary exhaust airflow devices in order to maintain a volumetric offset (either positive or negative). Offset shall be maintained regardless of any change in flow or static pressure. This offset shall be field adjustable and represents the volume of air, which will enter (or exit) the room from the corridor or adjacent spaces.
  - 2. The pressurization control algorithm shall sum the flow values of all supply and exhaust airflow devices and command appropriate controlled devices to new set points to maintain the desired offset. The offset shall be adjustable.
  - 3. Volumetric offset shall be the only acceptable means of controlling room pressurization. Systems that rely on differential pressure as a means of control shall provide documentation to demonstrate that space pressurization can be maintained if fume hood sashes are changed at the same time a door to the space is opened.
  - 4. The pressurization control algorithm shall support the ability to regulate the distribution of total supply flow across multiple supply airflow control devices in order to optimize air distribution in the space.
- C. Emergency Mode Control
  - 1. The laboratory control system shall provide a means of overriding temperature and pressurization control in response to a command indicating an emergency condition exists, and airflow control devices are to be driven to a specific flow set point. The system shall support up to four emergency control modes. The emergency control modes may be initiated either by a local contact input or BMS command.
  - 2. Once an emergency mode is invoked, pressurization and temperature control are overridden for the period that the mode is active. Emergency modes shall have a priority scheme allowing a more critical mode to override a previously set condition.

2.05 Interface to Building Management Systems

- A. The laboratory airflow control system network shall have the capability of digitally interfacing with the BMS. The required software interface drivers shall be developed and housed in a dedicated interface device furnished by the laboratory airflow control system supplier.
- B. The interface device shall be a BTL Certified BACnet Level 4 gateway, and shall communicate via BACnet over IP.
- C. All room-level points shall be available to the BMS for monitoring or trending. The gateway shall maintain a cache of all points to be monitored by the BMS. The room-level airflow control devices shall update this cache continually.

Part 3.0 Execution

3.01 Installation

- A. The laboratory airflow control system (LACS) contractor shall install the sash sensors, interface boxes, and fume hood monitor on the fume hood. Reel-type sash sensors and their stainless steel cables shall be hidden from view. Bar-type sash sensors shall be affixed to the individual sash panels. Sash interface boxes with interface cards shall be mounted in an accessible location.
- B. The LACS contractor shall install all routers and repeaters in an accessible location in or around the designated laboratory room.
- C. The LACS shall install an appropriately sized and fused 24 VAC transformer suitable for NEC Class II wiring.
- D. All cable shall be furnished and installed by the LACS contractor. The LACS contractor shall terminate and connect all cables as required.
- E. The mechanical contractor shall install all airflow control devices in the ductwork and shall connect all airflow control valve linkages.
- F. Each pressurization zone shall have either a dedicated, single-phase primary circuit or a secondary circuit disconnect.

3.02 System Start-up, Project Support, Documentation and Training

- A. The laboratory startup and commissioning shall be performed by a factory-authorized representative of the laboratory airflow control system manufacturer. The representative must have at least five (5) factory trained technicians under their direct employment in the State of California. The representative will provide the initial engineering, project support and project commissioning for this project. Start-up shall include calibrating the fume hood monitor and any combination sash sensing equipment, as required. Start-up shall also provide electronic verification of airflow (fume hood exhaust, formaldehyde exhaust, and make-up air), system programming and integration to the BMS.
- B. The laboratory airflow control system supplier shall furnish a minimum of four hours of owner training by factory trained and certified personnel. The training will provide an overview of the job specific airflow control components, verification of initial fume hood monitor calibration, general procedures for verifying airflows of air valves and general troubleshooting procedures. Operation and maintenance manuals, including as-built wiring diagrams and component lists, shall be provided for each training attendee.

END OF SECTION 23 09 13

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Scope Of Work: The work under this division includes furnishing all labor, material, and equipment necessary for the installation and placing into operation of the electrical systems as indicated on the drawings. The work includes, but is not necessarily limited to, furnishing and installing the following:
1. Complete power and lighting, distribution board, generator and all accessories, transformers, panels, switches, feeders, branch circuits, lighting fixtures, lamps, controls and accessories.
  2. Motor and power wiring for all motor and/or equipment furnished under the contract. Except as otherwise specified to be furnished by or under other divisions of this specification, all wiring devices, conduit, feeders, and final connections to all equipment shall be furnished under this section.
  3. Install electrical control wiring for all equipment, except as described in 1.24, "Mechanical/Electrical Coordination Requirements".
  4. All equipment and materials specified in this division.
  5. Empty conduit systems as indicated on the drawings.
  6. All other items and/or work indicated on the drawings.
  7. Extension of the existing power and communications systems.
- B. This division of the specification outlines the provisions of the contract work to be performed under this division. This section applies to and forms a part of each section of specifications in Division 26 and all work performed under the electrical and communications contracts. In addition, work in this division is governed by the provisions of the bidding requirements, contract forms, general conditions, supplementary conditions, and all sections under general requirements.
- C. These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.
- D. Where the word 'provide' or 'provision' is used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.
- E. Where items are specified in the singular, this division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

1.02 DEFINITIONS

- A. Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings B acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
- B. Exposed, Non-concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.
- C. Finish Space: Any space ordinarily visible, including exterior areas.

### 1.03 SUBMITTALS

#### A. Shop Drawings:

1. Submit shop drawings and all data in accordance with Section 01 33 00 for all equipment provided under this division.
2. Shop drawings submittals processed are not change orders: the purpose of shop drawings submittals by the contractor is to demonstrate to the Architect that the Contractor understands the design concept. He demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals are processed, the design drawings and specifications shall control and shall be followed.

#### B. Manufacturer's data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.

#### C. Index all submittals and reference to these specifications. All submittal items shall be assembled and submitted in a single complete binder. Partial submittals will not be reviewed.

#### D. Project Closeout: Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this division, as described below.

##### 1. Equipment Lists and Maintenance Manuals:

- a. Prior to completion of job, contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this section of the specifications:
  2. Name, model, and manufacturer
  3. Complete parts drawings and lists
  4. Local supply for parts and replacement and telephone number.
5. All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.
6. Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

### 1.04 QUALITY ASSURANCE

#### A. The following standard publications of the latest editions enforced and supplements thereto shall form a part of these specifications. All electrical work must, as a minimum, be in accordance with these standards.

1. National Electrical Code
2. National Fire Protection Association

3. Underwriters' Laboratories, Inc. (UL)
  4. Certified Ballast Manufacturers' Association (CBM)
  5. National Electrical Manufacturers' Association (NEMA)
  6. Institute of Electrical & Electronics Engineers (IEEE)
  7. American Society for Testing & Materials (ASTM)
  8. National Board of Fire Underwriters (NBFU)
  9. National Board of Standards (NBS)
  10. American National Standards Institute (ANSI)
  11. Insulated Power Cable Engineers Association (IPECS)
  12. Electrical Testing Laboratories (ETL)
  13. National Electrical Safety Code (NESC)
  14. California Electrical Code Title 24, Part 3
  15. California Building Code
  16. Americans with Disability Act (ADA)
- B. Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of NFPA, and serving utility requirements.
- C. Owner shall pay all permit fees and inspections required by any public authority having jurisdiction. Contractor shall coordinate work and arrange inspections with any public authority having jurisdiction.
- D. Installation procedures methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).
- E. Cover no work until inspected, tested, and approved by the Architect. Where work is covered before inspection and test, uncover it and when inspected, tested, and approved, restore all work to original proper condition at no additional cost to Owner.

#### 1.05 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are intended to complement each other. Where a conflict exists between the requirements of the drawings and/or the specifications, request clarification.
- B. The Architect shall interpret the drawings and the specifications, and his decision as to the true intent and meaning thereof and the quality, quantity, and sufficiency of the materials and workmanship furnished there under shall be accepted as final and conclusive.
- C. In case of conflicts not clarified prior to Bidding deadline, use the most costly alternative (better quality, greater quantity, or larger size) in preparing the Bid. A clarification will be issued to the successful Bidder as soon as feasible after the Award and if appropriate, a deductive change order will be issued.
- D. All provisions shall be deemed mandatory except as expressly indicated as optional by the word "may" or "option".

#### 1.06 EXAMINATION OF PREMISES

- A. Examine the construction drawings and premises prior to bidding. No allowances will be made for not being knowledgeable of existing conditions.

#### 1.07 WORK AND MATERIALS

- A. Unless otherwise specified, all materials must be new and of the best quality. Perform all labor in a thorough and workmanlike manner, to the satisfaction of the Architect.
- B. All materials provided under the contract must bear the UL label where normally available. Note that this requirement may be repeated under equipment specifications. In general, such devices as will void the label should be provided in separate enclosures and wired to the labeled unit in proper manner.

#### 1.08 SUBSTITUTIONS

- A. Substitutions will be allowed only in strict conformance with the General Conditions of the Contract and Division.
  - 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 substantially equal or better in every respect to that so indicated or specified. If material, process, or article offered by Contractor is not, in opinion of architect, substantially equal or better in every respect to that specified, then Contractor shall furnish material, process or 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 "or equal" item within thirty-five (35) days after award of contract. Provision authorizing submission of "or-equal" justification data shall not in any way authorize an extension of time for performance of this contract.

#### 1.09 EQUIPMENT PURCHASES

- A. Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.
- B. Provide all materials of similar class or service by one manufacturer.

#### 1.10 COOPERATIVE WORK

- A. Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.
- B. Cooperative work includes: General supervision and responsibility for proper location and size of work related to this division, but provided under the other sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this division.

#### 1.11 VERIFICATION OF DIMENSIONS

- A. Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in properly fitting equipment and materials together and to the structure in spaces provided.
- B. Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in



manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clean, and maintain proper clearances.

#### 1.12 CLEANUP

- A. In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.
- B. Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.
- C. During the progress of the work, keep the premises clean and free of debris.

#### PART 2 – PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.01 CUTTING AND PATCHING

- A. Cut existing work and patch as necessary to properly install new work. As the work progresses, leave necessary openings, holes, chases, etc., in their correct location. If the required openings, holes, chases, etc., are not in their correct locations, make the necessary corrections at no cost to the Owner. Avoid excessive cutting and do not cut structural members without the consent of the Architect and DSA.

##### 3.02 CONCRETE

- A. Where used for structures to be provided under the contract such as bases, etc., concrete work, and associated reinforcing shall be as specified under architectural. See architectural drawings for details.
- B. See other sections for additional requirements for underground vaults, cable ducts, etc.

##### 3.03 PAINTING

- A. Paint all unfinished metal with one coat of rust-inhibiting primer. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)
- B. Finished painting is specified Under "Finishes".
- C. Furnish all connections to electrical services furnished under other sections except as otherwise specifically designated. Provide all necessary connections, etc., required to properly connect all services and equipment.
- D. General: Painting requirements of this section are supplementary to other Painting Sections.
- E. Switchboards, panels, terminal cabinets, equipment enclosures, wireways, boxes, conduit, etc.: Standard gray or galvanized manufacturers' finish unless otherwise noted herein.
- F. Exceptions in public areas:
  - 1. Flush panels and cabinets: Fronts shall have factory applied primer and field applied oil base semi-gloss enamel finish coat (except metal plated parts) to match adjacent wall surfaces.

2. Surface panels, cabinets and wireways: Same as "1. Flush Panels" above except also paint the enclosure (can) using the same paint as is on adjacent surface in lieu of semi-gloss paint. Apply etching compound (galvanized surfaces) and undercoater prior to finish coat.
3. Surface and flush boxes: Paint to match adjacent surfaces as described in "2. Surface panels" above.
4. Exposed conduit: Paint to match adjacent surfaces as described in "2. Surface panels" above.
5. Ferrous metal miscellaneous parts (except stainless steel): Galvanized in accordance with ASTM A123 or A153.
6. Lighting fixtures in public areas: Standard manufacturers' finish except as modified by the LIGHTING section, including Fixture Schedule. Exception: Paint the trims of recessed fixtures to match adjacent wall or ceiling surface if so directed by Owner's representative.
7. Wiring devices, device plates and floor boxes in public areas: As specified in WIRING DEVICES and DEVICE PLATES Sections.

#### 3.04 UTILITY SERVICES

- A. Upon notification of award of contract, notify the serving power, telephone utilities of the following:
  1. Name and address of Contractor.
  2. Estimated times of construction start, completion and required service connections.
  3. Project service voltage, phase load, and service size.

#### 3.05 TEMPORARY LIGHTING AND POWER

- A. Contractor shall provide on-site generation, labor, materials and/or any required utility fees associated with the installation and maintenance of a temporary power source for Contractor's equipment or field offices during the period of construction.
- B. Building and site shall be sufficiently illuminated so that construction work can be safely performed. Lights shall be controlled by switches located with consideration for safety, security, and convenience.

#### 3.06 RECORD DRAWINGS

- A. The Electrical Division shall maintain record drawings as specified in Section 01 78 39.
- B. Drawings shall show locations of all concealed and exposed conduit runs, giving the number and size of conduit wires. Underground ducts shall be shown with cross section elevations. Drawing changes shall not be identified only with referencing COR's and RFI's, the drawings shall reflect all the actual changes made.
- C. Two sets of reproducible as-built drawings shall be delivered to the Architect. See Section 01 78 39 for additional requirements.

#### 3.07 EXCAVATION AND BACKFILL

- A. Perform all necessary excavation, shoring, and backfilling required for the proper laying of all conduits inside the building and premises, and outside as may be necessary. Remove all excess excavated materials from the site, or as otherwise directed by the Architect.
- B. Excavate all trenches open cut, keep trench banks as nearly vertical as practicable, and sheet and brace trenches where required for stability and safety. Excavate trenches true to line and make bottoms no wider than necessary to provide ample work room. Grade trench bottoms accurately. Machine grade only to the top line of the conduits, doing the remainder by hand. Do not cut any trench near or under



- |                                    |        |
|------------------------------------|--------|
| 3. Nurse Call System               | Blue   |
| 4. Music/Paging System             | Yellow |
| 5. Intercom System                 | Pink   |
| 6. Telephone System                | White  |
| 7. Data System                     | Gray   |
| 8. SMATV/Radio Program System      | Brown  |
| 9. Miscellaneous Signaling Systems | Violet |

D. Lighting and Local Panelboards Transformers:

1. Panel identification shall be with white and black micarta nameplates. Emergency power distribution panels shall be identified with red and white micarta nameplates. Letters shall be no less than 3/8" high.
2. Circuit directory shall be 2-column typewritten card set under glass or glass equivalent. Each circuit shall be identified by the room number and/or number of unit and other pertinent data as required.
3. The circuit directory shall reference the building number and room number as designated by the school directory. Circuit directories which reference the building number and room number as designated on drawings are not acceptable.

E. Distribution Switchboards and Feeders Sections, Motor Control Centers, Automatic Transfer Switches:

1. Identification shall be with 1" H 4" laminated white micarta nameplates with black lettering on each major component, each with name and/or number of unit and other pertinent data as required. Emergency power distribution panels shall be identified with red micarta nameplates and white lettering. Letters shall be no less than 3/8" high.
2. Circuit breakers and switches shall be identified by number and name with 3/8" H 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to or on circuit breaker or switch.

F. Disconnect Switches, Motor Starters and Transformers:

1. Identification shall be with white micarta laminated labels and 3/8" high black lettering.
2. Emergency equipment shall be identified with red labels and 3/8" high white lettering.

3.11 CONSTRUCTION FACILITIES

- A. Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.
- B. Temporary power and lighting for construction purposes shall be provided under this section. Refer to 'temporary facilities' for description of work.

3.12 GUARANTEE

- A. Guarantee all material, equipment and workmanship for all sections under this division in writing to be free from defect of material and workmanship for one year from date of final acceptance, as outlined in the general conditions. Replace without charge any material or equipment proving defective during this period. The guarantee shall include performance of equipment under all site conditions, conditions of load, installing any additional items of control and/or protective devices, as required.

3.13 PATENTS

- A. Refer to the General Conditions for Contractor's responsibilities regarding patents.

3.14 MECHANICAL / ELECTRICAL COORDINATION REQUIREMENTS

- A. All electrical work performed for this project shall conform to the National Electrical Code, to Local Building Codes and in conformance with Division 26 of these specifications whether provided under the Mechanical or the Electrical sections of the specifications. Where the mechanical contractor is required to provide electrical work, he shall arrange for the work to be done by a licensed electrical contractor using qualified electricians. The Mechanical Contractor shall be solely and completely responsible for the correct functioning of all mechanical equipment regardless of who provided the electrical work.
- B. The Mechanical Contractor shall provide the following:
1. All motors required by mechanical equipment.
  2. All starters for mechanical equipment which are integral to equipment scheduled and / or specified.
  3. All wiring interior to packaged equipment furnished as an integral part of the equipment.
  4. All control wiring for mechanical systems.
  5. All control systems required by mechanical equipment.
  6. Control wiring shall be defined as all wiring, either line voltage or low voltage, required for the control and interlocking of equipment, including but not limited to wiring to motor control stations, solenoid valves, pressure switches, limit switches, flow switches, thermostats, humidistats, safety devices and other components required for the proper operation of the equipment.
  7. Motor starters supplied by Mechanical shall be fused combination type minimum size 1, and conform to appropriate NEMA standards for the service required. Provide NEMA type 3R/12 enclosures in wet locations. Provide all starters with appropriately sized overload protection and heater strips provided in each phase, hand/off auto switches, a minimum of 2 NO and NC auxiliary contacts as required, and an integral disconnecting means. For 1/2 horsepower motors and below, when control requirements do not dictate the use of a starter, a manual motor starter switch with overload protection in each phase may be provided. Acceptable manufacturers are Allen Bradley, General Electric, Square D, Furnas and Westinghouse.
- C. The Electrical Contractor shall provide the following for mechanical equipment:
1. All power wiring.
  2. Electrical disconnects as shown on the electrical drawings.
  3. All starters not integral to equipment scheduled and / or specified and all starters forming part of a motor control center.
- D. All power wiring and conduit to equipment furnished under Mechanical Division shall be provided under Electrical Division. Control wiring, whether line voltage or low voltage, shall be provided under the division which furnishes the equipment.
- E. Conduit for wiring for all HVAC and plumbing control shall be furnished and installed under Electrical Division.
- F. Power wiring shall be defined as all wiring between the panelboard switchboard overcurrent device, motor control center starter or switch, and the safety disconnect switch or control panel serving the equipment. Also, the power wiring between safety disconnect switch and the equipment line terminals.
- G. All motor starters which are not part of motor control centers and which are required for equipment furnished under this division shall be furnished and installed under the Electrical Division.

- H. Electrical Division shall make all final connections of power wiring to equipment furnished under this division.
- I. Wiring diagrams complete with all connection details shall be furnished under each respective section.

### 3.15 EQUIPMENT ROUGH-IN

- A. Rough-in all equipment, fixtures, etc. as designed on the drawings and as specified herein. The drawings indicate only the approximate location of rough-ins. The exact rough-in locations for manufactured equipment must be determined from large scale certified drawings. Mounting heights of all switches, receptacles, wall mounted fixtures and such equipment must be coordinated with the architectural designs. The contractor shall obtain all rough-in information before progressing with any work for rough-in connections. Minor changes in the contract drawings shall be anticipated and provided for under this division of the specifications to comply with rough-in drawings.

### 3.16 OWNER-FURNISHED AND OTHER EQUIPMENT

- A. Rough-in and make final connections to all Owner-furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.

### 3.17 EQUIPMENT FINAL CONNECTIONS

- A. Provide all final connections for the following:
  - 1. All equipment furnished under this Division.
  - 2. Electrical equipment furnished under other sections of the specification.
  - 3. Owner-furnished equipment as specified under this Division.

### 3.18 INSERTS, ANCHORS, AND MOUNTING SLEEVES

- A. Inserts and anchors must be:
  - 1. Furnished and installed for support of work under this Division.
  - 2. Adjustable concrete hanger inserts installed in new concrete work shall be as manufactured by Grinnell or approved equal.
  - 3. Installed in location as approved by the Architect. Expandable lead type anchors installed in existing concrete with minimum surface damage, as manufactured by Ackerman-Johnson, Pierce, Diamond, or Hilti.
  - 4. Toggle Bolts, or "Molly-Anchors" where installed in concrete block walls.
  - 5. Complete with 3/16" or heavier steel back-up plate where used to support heavy items. Thru-bolts for back-up plate shall be concealed from view, except as otherwise indicated. Refer to drawings for details of supports at post-tension concrete slab.
  - 6. Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.
- B. Furnish and install all sleeves as required for the installation of all work under all sections of this division. Sleeves through floors, roof, and walls shall be as described in conduit section.

### 3.19 SEISMIC RESTRAINTS

- A. Provide the work in compliance with the most stringent seismic requirements for site specific, of applicable Codes including the Title 24 and California Code of Regulations (CCR) Uniform Building Code, but with the requirements herein as minimum standards. Provide seismic restraints for materials and equipment of this Division, including (but not limited to) the items listed below. The attachments shall resist forces applied to the center of gravity of the components. Criteria shall be the operating weight of the item times .5g for horizontal forces and .33g for vertical forces. Design for the horizontal force to be applied in any direction. Wall mounted or suspended components shall, in addition, resist a downward force of 200 pounds minimum added to the operating weight.
- B. All switchgear and other free standing electrical equipment shall be anchored to withstand seismic forces in this area.
- C. Switchboards, transformers, and all free-standing panels or cabinets and similar equipment.
- D. Suspended lighting fixtures.
- E. Lighting fixtures integral with ceiling or directly mounted to ceiling.
- F. Suspended conduit hangers and trapezes.
- G. Suspended electrical conduit, 2-1/2" nominal size and larger, shall have individual hangers not longer than 12" from the top of the pipe to the bottom of the support for the hanger. If a longer hanger is used, Contractor shall apply seismic restraints. Supporting calculations and details shall be submitted for Title 24 compliance review.
- H. Four #9-12 gauge hanger wires shall be provided to each recessed troffer one located at each diagonal corner. In addition troffers shall be fastened with two self tapping screws at each end of fixture through housing to main runners of the T-bar grid. Installation of these screws shall in no way deform the fixture housing. Provide spacers between the fixture housing and the T-bar grid where required.
- I. Provide bracing and anchorage of conduit hangers and trapezes in accordance with SMACNA published "Guidelines for Seismic Restraints of Mechanical Systems".
- J. Pendant, suspended, or stem mounted lighting fixtures shall have approved earthquake resistant hangers if code required and have movable joints at ceiling and fixture when more than one stem is used per fixture. In addition, fixtures shall have steel stranded aircraft cable attached to the structure and to the fixture at each point of support, in addition to the fixture hanger. Cables shall be installed slack and shall be capable of supporting four times the vertical load. The fixture shall be capable of swinging 45° in any direction. Where a 45° swing would cause the fixture to strike a wall or other object, suitable cables or other means of bracing shall be added to prevent the fixture from swinging against the other object.
- K. Carefully review the space available to insure that the restraint systems proposed will not impair the required equipment clearance, working space or access.
- L. Submit details of the seismic anchorages and receive approval of the IOR and EOR prior to installation. Details shown on the drawings are for reference only and may not be suitable for the actual equipment to be installed. Exception: Details for seismic anchorage may be omitted for equipment installed on a floor or roof and weighing less than 400 lbs. but the installation shall be subject to the approval of the Owner's representative.

### 3.20 RUSTPROOFING

- A. Rust proofing must be applied to all ferrous metals as follows:

1. Hot-dipped galvanized shall be applied after forming of angle-iron, bolts, anchors, etc.
2. Hot-dipped galvanized shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

### 3.21 GENERAL WIRING

- A. Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.
- B. In those isolated instances in which construction conditions will not permit staggered outlet boxes, provide "Flamesafe" FSD 1077 fire stopping pads or approved equal, over the outlet box.
- C. Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Architect as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.
- D. Provide proper size and type of feeds from proper sources for all such items indicated, checking drawings of all trades to ensure inclusion of all items.

### 3.22 SEPARATE CONDUIT SYSTEMS

- A. Each electrical and signal system shall be contained in a separate conduit system as shown on the drawings and as specified herein. This includes each power system, each lighting system, each signal system of whatever nature, telephone, emergency system, sound system, control system, fire alarm system, etc.
- B. Further, each item of building equipment must have its own run of power wiring. Control wiring may be included in properly sized conduit for equipment feeders of #6 AWG and smaller, having separate conduit for larger sizes.

### 3.23 SPECIAL CONDUIT REQUIREMENTS

- A. The electrical contractor shall furnish and install all conduits for the total and complete conduit for the following communication systems.
  1. Clock and Bell
- B. The fire alarm system shall be in conduit at all areas.
- C. Conduit for all low voltage systems, including fire alarm and clock and bell located above suspended ceiling shall be installed below gypsum board on bottom chord of truss, exposed.
- D. Provide a pull chord in all spare conduit and where conductors are installed by others.

END OF SECTION 26 05 00



SECTION 26 05 13 – POWER CONDUCTORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, Division One, and Section 26 05 00 Common Work Results for Electrical apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Conductors, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Furnishing and installing wire and cable for branch circuits and feeders.

1.02 SUBMITTALS

- A. Submit manufacturer's data for the following items:
  - 1. 600 volt cables

PART 2 - PRODUCTS

2.01 WIRE AND CABLE RATED 120 VOLT TO 600 VOLT

- A. All wire and cable shall be new, 600 volt insulated copper, of types specified below for different application.
  - 1. Conductor Material: Copper
  - 2. All conductor sizes shall be designated by American Wire Gauge ( AWG ) or Thousand Circular Mills. ( kcmil ).
  - 3. Wire used as feeders to switchboards, panelboards, motor control centers or other major electrical components shall be type XHHW-2.
  - 4. All underground conductors shall be Type XHHW-2.
  - 5. Wire and cable larger than #6 AWG shall be type XHHW-2
  - 6. Wire #6 AWG and smaller shall be type THHN.
  - 7. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG.
  - 8. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load.
  - 9. Wire indicated to be larger than No. 12 must be increased the entire length of the circuit.
  - 10. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.
- B. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages.
- C. Wire insulation shall be color as specified herein.

2.02 WIRE AND CABLE FOR SYSTEMS BELOW 120 VOLTS

- A. All low voltage and communications systems cable shall be plenum rated.

PART 3 - EXECUTION

3.01 SYSTEMS 600 VOLT OR BELOW

- A. Wire and cable shall be pulled into conduits without strain using powdered soapstone, mineralac, or other approved lubricant. In no case shall wire be repulled if same has been pulled out of a conduit run for any purpose. No conductor shall be pulled into conduit until conduit system is complete, including junction boxes, pull boxes, etc.
- B. All connections and joints in wires shall be made as noted below:
- C. Connections to outlets: Wire formed around binding post of screw.
- D. No. 8 wire and larger - Burndy "Quick-Lug" type QDA, or approved equal, round flange, solderless lug.
- E. Fixture Connections: Circuit wiring connections to fixture wire shall be made with pressure type solderless connectors, Buchanan, Scotchlock, Wing Nut, or approved equal.
- F. Joints in Wire: No. 6 wire and larger, Burndy or approved equal.
- G. No. 8 wire and smaller - Buchanan, Scotchlock, Wing Nut, or equal pressure type solderless connectors.
- H. Uninsulated solderless connectors shall be insulated as follows: Tape and covering of rubber tape, equal in thickness in the insulation. This shall be followed with an outer covering of vinyl tape in two layers.
- I. All wiring throughout shall be color-coded as follows:

	<u>480-Volt System</u>	<u>208-Volt System</u>
A Phase	Brown	Black
B Phase	Orange	Red
C Phase	Yellow	Blue
Neutral	Grey	White
Ground	Green	Green

- J. Wiring must be color-coded throughout its entire length, except feeders may have color-coded plastic tape at both ends and any other accessible point.
- K. All control wiring in a circuit shall be color-coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.
- L. At all terminations of control wiring, the wiring shall have a numbered T & B or Brady plastic wire marker.
- M. 120 volt control wiring may be installed with the power conductors when insulated at the same voltage level as the power conductors. All other control and instrumentation wiring must be installed in a separate conduit.

- N. Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.
- O. Wire and cables when installed in underground pull boxes shall not be spliced. All wire and cable in underground pull boxes shall be continuous.
- P. Wire and cable when installed in underground pull boxes shall be neatly strapped / looped together and anchored to side walls of junction box. The wire and cable shall be neatly strapped to the side walls of junction boxes to keep the floor of the junction box open.

END OF SECTION 26 05 13

SECTION 26 05 26 - GROUNDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, Division One, and Section 26 05 00 Common Work Results for Electrical apply to this section.
- B. The scope of work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Grounding, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Furnish and install grounding and grounding conductors.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 GROUNDING

- A. All grounding shall be in accordance with CEC Article 250.
- B. All panelboard cabinets, equipment, enclosures, and complete conduit system shall be grounded securely in accordance with pertinent sections of Article 250 of CEC. Conductors shall be copper. All electrically operated equipment shall be bonded to the grounded conduit system. All non-current carrying conductive surfaces that are likely to become energized and subject to personal contact shall be grounded by one or more of the methods detailed in Article 250 CEC. All ground connections shall have clean contact surfaces. Install all grounding conductors in conduit and make connections readily accessible for inspection. Furnish and install grounding electrodes as described on the drawings.
- C. Grounding of metal raceways shall be assured by means of provisions of grounding bushings on feeder conduit terminations at the panelboard, and by means of insulated continuous stranded copper grounding wire extended from the grounds bus in the panelboard to the conduit grounding bushings.
- D. Except for connections which access for periodic testing is required, make grounding connections which are buried or otherwise inaccessible by exothermite type process.
- E. Equipment Grounding Conductors:
  - 1. Provide copper THWN insulated equipment grounding conductors in all raceways.
  - 2. The grounding conductors shall be provided whether scheduled or shown on the drawings or not, and, if necessary, the conduit size shall be increased to accommodate them. These grounding conductors shall be connected to the ground terminals on the device or enclosure at each end of the installation and shall be interconnected with the other ground terminals and conductors to form a continuous wired grounding system throughout the electrical wiring system.
- F. Ground Rods: 3/4" diameter × 8-foot copper clad steel. Drive full length into earth with the top 3-inch minimum below grade or underside of slab. Where ground rods cannot be driven vertically to the desired depth below grade, they shall be driven at an angle away from or parallel to the exterior

wall. When driven parallel to the wall, the angle shall not exceed 45degrees. The rod shall penetrate to a depth of permanent ground moisture. When ground rods cannot be driven because of bedrock at less than 4 feet below grade level, a counterpoise ground electrode shall be used in place of rods. The counterpoise system shall consist of not less than 50 feet of No. 2 AWG bare tinned copper wire, buried to a depth of at least 18" below grade, for each ground rod shown. The wires shall be run in a straight line. Each pad-mounted transformer and vacuum interrupting sectionalizing switch shall be grounded using the methods indicated herein.

- G. Connections: Connection to inaccessible ground rods below ground shall be made using exothermic welding devices. Above ground and accessible connections shall be made using exothermic devices. Multiple bolt silicon bronze connectors, Burndy or O.Z. Electric; or exothermic welded, Burndy, Erico Cadweld products, or equal.
- H. Test each grounding electrode for resistance at the connection point before connecting any wires. Resistance at the grounding electrode shall not exceed the following:
  - 1. Service Equipment, 25 ohms
  - 2. Interior Electrical Systems, 25 ohms
  - 3. Exterior Transformers, 10 ohms
  - 4. Junction Boxes and Manholes, 10 ohms
- I. If the above values are not achieved with the installed system, notify the Owner's representative.
- J. Each ground electrode shall be tested using a ground resistance meter, or other suitable instrument, in conformance with the manufacturer's directions. Submit a report listing as a minimum the date of testing, name of tester, instrument used, location and type of ground electrode, and resistance in ohms. Submit within five (5) days after testing is completed.

END OF SECTION 26 05 26

SECTION 26 05 33 – RACEWAY AND BOXES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General and Supplementary Conditions, Division One, and Section 26 05 00 Common Work Results for Electrical apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Raceway and Boxes, as indicated on the drawings, specified herein, or reasonably required to complete the work.

1.02 SUBMITTALS

- A. Submit manufacturer's data on the following:
  - 1. Conduit
  - 2. Fittings
  - 3. Fire Seal Material

1.03 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. RNC: Rigid nonmetallic conduit.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with CEC.

PART 2 - PRODUCTS

2.01 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Alflex Inc.
  - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.

4. Anamet Electrical, Inc.; Anaconda Metal Hose.
  5. Electri-Flex Co.
  6. Manhattan/CDT/Cole-Flex.
  7. Maverick Tube Corporation.
  8. O-Z Gedney; a unit of General Signal.
  9. Wheatland Tube Company.
- B. IMC: ANSI C80.6.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel or aluminum.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings for Conduit (including all types and flexible and liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
  2. Fittings for EMT: Steel, set-screw or compression type.

## 2.02 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
  2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  3. Arnco Corporation.
  4. CANTEX Inc.
  5. Certain Teed Corp.; Pipe & Plastics Group.
  6. Condux International, Inc.
  7. ElecSYS, Inc.
  8. Electri-Flex Co.
  9. Lamson & Sessions; Carlon Electrical Products.
  10. Manhattan/CDT/Cole-Flex.
  11. RACO; a Hubbell Company.
  12. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise noted.
- C. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

## 2.03 BOXES

- A. Boxes shall be as manufactured by Steel City, Appleton, Raco, or approved equal.
- B. All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box.
- C. Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast aluminum. Boxes shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Bodies shall

have threaded hubs for rigid conduit and neoprene gaskets for their covers. Bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.

- D. Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster. Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the placing of conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.
- E. All light, switch, receptacle, and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.
- F. Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend 3/4" past boxes all around. Covers for 4" square and 4" ganged boxes shall extend 1/4" past box all around.

### PART 3 – EXECUTION

#### 3.01 CONDUIT INSTALLATION – GENERAL

- A. Continuously check the work previously installed to prevent any interference between the various installations. Should structural difficulties or other work prevent the routing of conduit as indicated on the drawings, make necessary deviations there from as directed by the Owner's representative.
- B. Route conduit so as to clear beams, plates, footings and structural members, whether or not indicated on the plans. Do not run conduit through any structural member of the building, except as specifically directed by the Owner's representative. Under no circumstances run conduits through column footings or grade beams.
- C. Concrete Slabs on Grade: Conduit shall not be installed in slab on grade.
- D. Where conduit penetrates a fire-rated separation, any of the following packing methods may be used to restore the integrity of the separation if Code approved: cement, mineral fiber sprayed with a flame retardant coating, or Dow Corning 3-6548 RTV silicon foam, 3M caulk #CP25, 3M putty #303, or equal. Seal shall be water-tight and shall be accomplished prior to wire pulling.
- E. Where a conduit enters building through the concrete foundation wall or floor below ground water level, a watertight entrance seal shall be used. These seals shall be 0.Z. Type "FSK" or "WSK", or as equal.
- F. Do not run conduit closer than 6 inches to any uninsulated hot water or steam pipe, heater flue or vent. If pipe is insulated, the clearance may be reduced to 2-inch. Provide condulets for exposed runs of conduit where junction, bends or offset are required, whether such condulets are indicated on the plans or not. No bends are permitted around corners, beams, wall or equipment. No running threads are permitted. Run a die over factory threads to ensure that they are clean and free from all coating material and that good metallic contact with the fittings is obtained. Paint the exposed portion of field-cut threads with a suitable zinc-rich paint.
- G. Upon completion of each run of conduit, test the run and clear it of all obstructions. Plug each conduit end with conduit pennies and bushings or manufacturers' seals until ready for pulling wire.



Provide a 200-pound test nylon or polypropylene pull rope in each empty conduit, tie off rope at each end, and provide an identification tag on rope at each end.

- H. All branch circuits shall be installed in void spaces and not in concrete floor slabs unless for floor receptacles.
- I. Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than 3/4-inch.
- J. Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the NEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.
- K. Flexible conduit shall be used as shown on drawings and only to connect motors, transformers, and other equipment subjected to vibration. Flexible conduit shall not be used to replace EMT in other locations.
- L. Flexible metal conduit shall be ferrous, in lengths not exceeding 6 feet. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.
- M. Liquid tight flexible conduit shall be used in conformance with NEC in lengths not to exceed 4 feet. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible conduit for all equipment connections in possible corrosive areas, e.g. kitchens and outside areas.
- N. Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.
- O. Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.
- P. All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, and electrical closets. No conduit shall be run exposed in finished areas without the specific approval of the Architect.
- Q. All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Baling wire shall not be used to support conduit.
- R. Where possible, all conduits for wiring within stud or movable partitions shall enter the partition from above.
- S. Conduits above lay-in grid-type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical.
  - 1. Water and waste piping not less than 3-inch.

2. Steam and condensate lines not less than 12-inch.
  3. Radiation and reheat lines not less than 6-inch.
- T. Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Architect.
- U. All empty conduits shall be provided a 1/2-inch polypropylene plastic pull cord and plastic plugs over the ends.
- V. The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.

### 3.02 CONDUIT INSTALLATION – ABOVE GRADE

- A. All conduits above grade or inside of a structure shall be metallic, except in masonry and concrete walls Schedule 40 may be used.
- B. Run conduit concealed, except as otherwise indicated.
- C. Run exposed conduit parallel with or at right angles to walls or as directed by the Owner's representative.
- D. Where conduits are placed in partitions necessitating cutting of any structural member, provide supports as directed by Owner's representative in accordance with applicable structural requirements.
- E. Locate conduit so as not to obstruct access or service to equipment.
- F. Conduit Passing Through the Roof: Flash and counterflash and/or provide a pitch pocket. Method shall be compatible with roofing system and acceptable to the Owner's representative.
- G. Conduit 1-inch and smaller over metal channel for lath and plaster or acoustical ceilings shall be tied to the supporting channels with 12 gauge galvanized tie wire spaced at a maximum of 10-foot intervals. Conduits shall not obstruct accessibility of ceiling or removal of panels. Do not use ceiling wires for support. Support exposed conduit 1-inch and smaller from building with T & B, or equal, pipe straps spaced at a maximum of 10-foot intervals. Attach supports with machine screws, nuts and lock washers in metal; wood screws in wood; and expansion shields or inserts in masonry or concrete. Perforated strap iron shall not be use. Conduits larger than 1-inch shall be suspended on pipe racks with Grinnell No. 107B, or equal, split-ring hangers and rods from concrete inserts.
- H. RSC shall be installed in interior wet locations, exposed exterior locations, and wherever specifically shown. Where installed in exterior locations, RSC and fittings shall be encased in PVC coated for corrosion protection. Conduit, from slab to bottom of surface-mounted panelboards, distribution panels, device outlet boxes, terminal cabinets, where exposed, shall be RSC. Conduit concealed in wall from slab to flush-mounted panels, distribution panels, terminal cabinets, and all device outlet boxes for all systems shall be EMT except to devices mounted at 36" or less in which case flexible conduit may be used. Contractor shall be allowed a dimension of 3 inches above slab to make transition from PVC to EMT, flex or rigid steel as allowed above.
- I. All above grade metallic conduit shall be EMT, unless noted otherwise
- J. Rigid steel conduit or IMC shall be used at the follow locations:
1. Exposed exterior locations.

2. Emergency feeders routed overhead.

### 3.03 CONDUIT INSTALLATION – UNDERGROUND

- A. Bury underground conduit (except under buildings) to a 30-inch minimum depth below finish grade to top of conduit. Deeper burial depths shall be as indicated on drawings, or as required to meet minimum spacing from other utilities' lines and obstructions.
- B. Plastic conduit shall be used only for all exterior underground systems, in slab, not on grade, and below slab, on grade. Install bell ends at all conduit terminations in manholes and pull boxes.
- C. Risers to grade shall be PVC-coated rigid galvanized steel unless otherwise noted.
- D. The ends of all underground conduits entering buildings and equipment shall be capped or sealed with acceptable compound, such as Crouse Hinds "Chico A", or equal, after installation of wire. Cap empty conduit stubouts at both ends. In landscaped areas, terminate in a waterproof J-box.
- E. Provide a plastic warning tape in the backfill over the ductlines approximately 12 inches below grade. Tape shall be run continuously along the entire length of the underground utility lines. Tape shall be polyethylene plastic manufactured specifically for warning and identification of all buried utility lines. Tape shall be of the type provided in rolls, 6-inches minimum width, color-coded for electric lines (red), and communications (orange) with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Tape shall consist of top and bottom layers of B-721 polyethylene or polyester with a center metallic foil core suitable for locating by a conventional detector at the specified depth. Tape shall be by Thor Enterprises, Brady, Seton, or equal. Submit data sheets as specified under "SUBMITTALS".
- F. Conduit Location Markers: Conduits stubbed or capped-off underground shall have their location identified with a concrete marker 6" × 6" × 12" high with a flush brass plate set in the 6" face. Identification of the conduit shall be stamped or engraved into the plate and the marker set flush with finished grade. Show exact location of markers and identification markings on as-built drawings. Submit data sheets as specified under "SUBMITTALS".
- G. Excavated materials not required or unsuitable for backfill shall be removed from the project site. Provide sheeting and shoring as necessary for protection of work and safety of personnel. Remove water from excavations by pumping or other approved method.
- H. Backfill shall be placed in layers not more than 6" thick and each layer shall be compacted. Backfilling shall progress as rapidly as the construction, testing and acceptance of the work permits. Backfill shall be free from roots, wood, scrap material, and other vegetable matter and refuse. Compaction of backfill shall be to 95 percent of maximum density. 80% of ASTM D method "D" maximum density.
- I. Backfill around underground structures such as manholes or handholes shall consist of sand and gravel, free from large clods of earth or stones over one inch size. Backfill materials shall be placed symmetrically on all sides in loose layers not more than nine inches deep. Each layer shall be moistened and compacted with mechanical or hand tampers to 90% compaction.

### 3.04 CONDUIT BENDING

- A. Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than NEC requirements.

- B. Not more than four 90 degree bends will be allowed in one raceway run. Where more bends are necessary, a pull box shall be installed. All bends in 1-inch and smaller shall be made with a conduit bender and all larger sizes shall have machine bends.

### 3.05 CONDUIT SUPPORTS

- A. Conduit shall be supported at intervals as required by the National Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. [No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers]. Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.
- B. Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel 3/8-inch diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.
- C. All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.
- D. Openings through fire-rated floors and fire and/or smoke walls through which conduits or cables pass shall be sleeved and sealed by fire stop material to seal off flame, heat, smoke and fire gases. Fire-seal material shall have an hourly fire rating equal to or higher than the fire rating of the floor or wall through which the cable or conduit pass. Sleeves provide for communication system cable shall be filled with fire-seal material.

### 3.06 CONDUIT FITTINGS

- A. Bushings and Lock Nuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by lock nuts on the outside, and a lock nut and bushing on the inside of the box. All conduits shall enter the box squarely.
- B. Furnish and install insulated bushings as per CEC on all conduits. The use of insulated bushings does not exclude the use of double lock nuts to fasten conduit to the box.
- C. Couplings and connectors for rigid steel or IMC conduit shall be steel or malleable iron, threaded, rain- and concrete-tight. Transition from plastic to steel conduits shall be with PVC female threaded adaptors. Couplings and connectors exposed, installed in hollow construction or above ceilings must be threaded, or compression type.
- D. Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.
- E. Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body.
- F. Install approved expansion fittings for conduits passing through all expansion and seismic joints.

### 3.07 BOXES

- A. Boxes shall be installed where required to pull cable or wire, but only in finished areas by approval of the Architect. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.
- B. Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.
- C. Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.
- D. All cabinets and boxes shall be secured by means of expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.
- E. Boxes with unused punched-out openings shall have the openings filled with factory made knockout seals.
- F. Where emergency power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.
- G. All outlet boxes and junction boxes for Fire Alarm and Emergency systems shall be painted red.

END OF SECTION 26 05 33

SECTION 26 05 43 - UNDERGROUND PULL BOXES

PART 1 – GENERAL

1.01 SUMMARY

- A. The provisions of Section 26 05 00 entitled Common Work Results for Electrical, General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with furnishing and installing underground pull boxes and manholes, as indicated on the drawings, specified herein, or reasonably required to complete the work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Communication Pull Box: JENSON PRECAST Variable Depth Pull Box, 3672 DPB, 3'-8" x 6'-8" dimension.
- B. Communication Pull Box Cover: JENSON PRECAST, Parkway, Hinged Cover, Style E, (2) Piece, with hold open assembly. Marked as "Communication".
- C. Electrical Pull Box: JENSON PRECAST Variable Depth Pull Box, 3048 DPB, 3'-2" x 4'-8" dimension.
- D. Electrical Pull Box Cover: JENSON PRECAST, Parkway, Bolt Down Cover, (1) Piece, Style F, with hold open assembly. Marked as "Electrical"

PART 3 - PRODUCTS

3.01 INSTALLATION

- A. Communication and Electrical Pull Boxes shall be installed so that elevation of cover shall be 6" above adjacent soil.
- B. Installation of Wire and Cable:
  - 1. Wire and cables when installed in underground pull boxes shall not be spliced. All wire and cable in underground pull boxes shall be continuous.
  - 2. Wire and cable when installed in underground pull boxes shall be neatly strapped / looped together and anchored to side walls of junction box. The wire and cable shall be neatly strapped to the side walls of junction boxes to keep the floor of the junction box open.
- C. Install as per manufacturers instructions.

END OF SECTION 26 05 43

SECTION 26 08 00 – TESTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Upon completion of the electrical work, the entire installation shall be tested by the electrical contractor, and demonstrated to be operating satisfactorily to the Architect, Engineer and Owner.
- B. All testing and corrections shall be made prior to demonstration of operation to the Architect, Engineer and Owner.
- C. Demonstration of operation shall include but not be limited to the following:
  - 1. Ground Fault
- D. In addition to the demonstration of operation, the Contractor is also required to review the content and quality of instructions provided on items demonstrated with the Architect, Engineer and Owner.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 TESTING

- A. Wiring shall be tested for continuity, short circuits and/or accidental grounds. All systems shall be entirely free from "grounds", short circuits", and any or all defects.
- B. Motors shall be operating in proper rotations, and control devices functioning properly. Check all motor controllers to determine that properly sized overload devices are installed, and all other electrical equipment for proper operation.
- C. Tests and adjustments shall be made prior to acceptance of the electrical installation by the Architect, and a certificate of inspection and acceptable of the electrical installation by local inspection authorities shall be provided.
- D. All equipment or wiring provided which tests prove to be defective or operating improperly shall be corrected or replaced promptly, at no additional cost to the Owner.
- E. Test all motor and feeder circuits with a "megger" tester to determine that insulation values conform to Section 110-20, California Electrical Code.
- F. After installation, and before placing in service, perform a D.C. High Potential Test on all cables rated above 600 volts. All precautions and limits as specified in the applicable standards shall be adhered to. Take care to ensure the cables being tested are disconnected from all equipment before testing. Current sensing circuits in test equipment shall measure only the leakage current associated with the cable under test, and shall not include internal leakage current of the test equipment. Test procedures shall be as follows and the results for each cable test shall be recorded and submitted to the Engineer for approval:
  - 1. Record temperature and relative humidity. Do not perform tests unless weather is clear and relative humidity is below seven percent (7%).

2. Each conductor shall be individually tested with all other conductors grounded. All shields shall be grounded.
3. Terminations shall be properly corona suppressed by guard ring, field reduction sphere, or other suitable methods.
4. A D.C. high potential shall be applied in at least five equal increments until maximum test voltage is reached. D.C. leakage current shall be recorded at each step after a constant stabilization time consistent with system charging current decay. 100% voltage shall be reached in a maximum of 60 seconds.
5. A graphic plot shall be made of leakage current (X-axis) versus voltage (Y-axis) at each increment.
6. The test conductor shall be raised to the maximum test voltage recommended by the manufacturer but not to exceed 30 kV and held for a total of 15 minutes. Readings of leakage current (Y-axis) versus time (X-axis) shall be recorded and plotted.
7. The conductor test potential shall be reduced to zero and grounds applied for at least ten minutes.

END OF SECTION 26 08 00



SECTION 26 20 00 ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of this contract, including General and Supplementary Conditions and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Electrical Distribution, as indicated on the drawings, specified herein, or reasonably required to complete the work.

1.02 SUBMITTALS

- C. Comply with requirements of Section 01 33 00 – SUBMITTALS
- D. Material List and Manufacturers' Literature
- E. Shop Drawings
- F. Operating and Maintenance Manuals.

1.03 ACCEPTABLE MANUFACTURERS

- A. Switchboards, breakers, service/metering equipment, panelboards, transformers, and safety switches: General Electric, Siemens, Square D, Westinghouse, or equal.
- B. Fuses: Bussman, Littel Fuse, Gould/Shawmut, or equal.
- C. Motor Starters: Allen Bradley, Furnas, General Electric, Square D, Westinghouse, or equal.
- D. Lighting Contractors: General Electric, Square D, Asco, or equal.

PART 2 - PRODUCTS

2.01 DRY-TYPE TRANSFORMERS – UNDER 600 VOLTS PRIMARY

- A. Transformers shall be ventilated dry type Class H, 150°C. rise, self-cooled with KVA ratings as shown on the drawings. Single phase and three phase transformers 10 KVA and below shall have two 5% full capacity taps below normal. Transformers above 10 KVA shall have two 2-1/2% full capacity primary taps above normal and two 2-1/2% full capacity primary taps below normal. Taps will be changed only when transformer is de-energized. The transformer core shall be cold-rolled, grain oriented silicon steel. Basic impulse level shall conform to ANSI Standard C57.12. Sound level shall not exceed 3 dB below ANSI and NEMA Standards. Impedance shall be approximately 4% for under 500 KVA and approximately 5.75% for 500 KVA and over.
- B. The enclosure shall be fabricated from 14 gauge or thicker steel. For floor mounting type, the base shall be 11 gauge or heavier and suitable for rolling or skidding into position. The terminal compartment shall be at the bottom. Accessories for installation such as lifting rings, jacking plates and wall mounting tabs shall be provided as required. Construction shall be drip proof and rodent proof. Where mounted outside, transformers shall be rain tight with non-ventilated enclosures. Finish shall be baked on enamel.

- C. Ventilated transformers shall have front, bottom and/or side openings for cooling. Transformers shall be mounted on rubber isolation pads and connected with flexible conduits for sound attenuation. The Contractor shall ascertain that the transformers he proposes to use will fit in the space allowed.
- D. A metal nameplate shall be installed by the manufacturer prominently on the outside of the enclosure. Nameplate shall have as a minimum the following information: Manufacturer, KVA, voltages, serial number, catalog number, type, impedance and wiring data.

## 2.02 SWITCHBOARDS – UNDER 600 VOLTS

- A. All new switchboards shall be by the same manufacturer.
- B. Sections shall be shipped connected together by the manufacturer, or separated and ready for field connection by the Contractor, in sizes that will allow them to be moved through the doors into their positions in the building.
- C. Sections shall be free standing, with front access, as shown or required, of angle iron or formed steel framework with steel panels enclosing all except the bottom. No raw or sharp metal edges shall be visible. Sections shall be constructed to UL standards.
- D. Finish shall be manufacturer's standard cataloged for indoor or outdoor use, as shown on the drawings. Finish shall be applied by the manufacturer.
- E. Busing shall be copper or aluminum and shall be formed and braced to withstand the effects of a fault current of minimum 50,000 amperes symmetrical. Copper bussing shall be silver plated at joints, and be connected with bolts and lock washers torqued as recommended by the manufacturer. All joints shall be made by welding or use of bolts and Bellville washers made up tight. Main bussing shall extend through all sections of the switchboard, and shall be of a current carrying capacity equal to the current rating of the main protective device as shown on the drawings. Neutral bussing shall be rated 100%. Busses shall be spaced according to the UL and NEC standards for bare busbar. Provide top and bottom provisions for future crossbus and cable extension. The vertical bus shall be drilled and tapped to accommodate new and future breakers, switches and devices. Cross busses near the bottom of the boards shall be insulated or barriered.
- F. A continuous copper ground bus shall be provided through all sections of the switchboard. All non-current carrying parts of the switchboard shall be solidly connected to this ground bus. The ground bus shall be sized to an ampacity of not less than 33% of the rating of the respective main bus.
- G. With 70° temperature in the room where installed, the phase, neutral, and ground bus shall be sized and rated for 100% continuous current carrying capacity based upon an ampere per square inch formula. Bus current carrying capacity ratings and physical sizing shall not be based on temperature rise alone. Copper bus shall have a minimum conductivity of 1000A/square inch. The temperature in any interior part of the switchyard shall not exceed 115°F.
- H. All lugs for cable connection shall be positive pressure bolted clamp type.
- I. Exterior plates and blank spaces not presently utilized shall be held in place by rigid supports arranged to prevent screws and plates from falling against energized parts. Interiors shall be fastened to the enclosure by adjustable supports to provide for proper alignment.
- J. Underground service pull section shall be top bussed and shall comply with the requirements of the serving utility.

- K. Securely anchor switchboard to a channel iron base which shall be furnished complete by the switchboard manufacturer. Bases shall be drilled and tapped to receive the switchboard and shall be fastened securely to the pad. Fill the entire base with grout and finish smooth. Switchboards shall be secured in accordance with Section 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL.
- L. Switchboards located outside shall have weatherproof enclosures and finish, and padlockable doors. Switchboards installed outdoors or exposed to weather shall have hinged front doors with vault type padlockable handles and three point latches. All openings shall be suitably designed to prevent the entry of weather, dust, animals and foreign matter.
- M. Provide a nameplate for each switchboard section and each item on the face of the switchboard as specified in Section 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL. Switchboard submittal shall contain a nameplate schedule.
- N. After installation, the boards shall be carefully cleaned. Any damaged paint shall be retouched with matching paint provided by the manufacturer of the switchboards.
- O. When the equipment is energized, live parts shall be protected by faceplates which shall not be removed or left unplaced without the immediate presence of the Electrical Contractor.
- P. Circuit breakers, switches, meters, ground fault protection, starters and other equipment to be included as an assembled part of a switchboard shall comply with the paragraphs where those items are specified.

### 2.03 CIRCUIT BREAKERS

- A. General: Breakers 400 ampere frame and larger shall be solid state trip (SST) type unless other special types are indicated on the drawings. Breakers with smaller than 400 ampere frames may be thermal magnetic trip (TM) or SST type unless otherwise indicated on the drawings. Thermal magnetic breakers rated 200 ampere and larger shall have adjustable instantaneous trip. Mounting height of breaker operating handles shall not exceed 6-1/2 foot above floor (consider housekeeping pad for floor mounted gear when determining the measurement).
- B. Solid state trip breakers (SST) shall be insulated or molded case type, ratings as indicated, equipped with ambient insensitive solid-state trips, with current sensors and solid-state logic circuits integral to the circuit breaker frame. Settings shall be sealable to prevent tampering.
- C. Breakers 600 amp frame and smaller shall have the following settings:
  - 1. Long time delay
  - 2. Continuous ampere setting
  - 3. Instantaneous pickup
- D. Breakers 800 amp frame and above shall have the following settings:
  - 1. Long time ampere rating
  - 2. Long time delay
  - 3. Long time pickup
  - 4. Short time pickup
  - 5. Short time delay
  - 6. Instantaneous pickup
  - 7. Ground fault pickup
  - 8. Ground fault delay

- E. Ground fault protection for solid state breakers shall be integral and shall have tripping devices, sensors and a test button allowing testing without tripping the breaker. Provide all other accessories shown, or needed for proper operation.
- F. Short circuit interrupting capacity shall be as indicated on the drawings and shall in no case be less than 10,000 at 120/240 volts or 14,000 RMS at 480 volts RMS symmetrical amps at the applied voltage.
- G. Breakers shall be molded case bolt-on type, except where other types are shown. Clamp-on, push-on, or plug-in type are not acceptable. Removable handle ties and dual, quad or tandem breakers are not acceptable. Mounting hardware, accessories, faceplates, and enclosures shall be provided as necessary for the intended use.
- H. Ground fault circuit interrupter (GFCI) type circuit breakers shall occupy the same space in a panel as a conventional breaker of the same rating and shall have a push-to-test button on the front. A ground current of 5 milliamps ( $\pm$ ) or more shall trip the breaker in less than 1/40 second. Each outlet on a GFI circuit shall be tested after installation and results of the test submitted in writing to the Architect.
- I. Submittal shall include interrupting capacities in RMS symmetrical amps at the applied voltage. Letter designations are not sufficient.
- J. Light duty commercial/residential type thermal magnetic breakers. Use only in Panels (not in Power Panels). Westinghouse Quicklag or equal.

#### 2.04 DISTRIBUTION PANELS

- A. Distribution panelboards shall be metal-enclosed, dead front type with sections joined together to form one assembly. Assembly shall consist of group mounted devices arranged so that they may be removed or interchanged from the front of the panel without disturbing the adjacent devices. Provide full capacity bus full height of panel with filler panels for unused portion of panel. Ties between sections shall be bussed. Busbars shall be braced for the available short circuit current indicated.
- B. General Electric CCB, Westinghouse type PR3 or PR4, or equal for 208/120V, or 480/277V panels.
- C. Busbars shall be copper or aluminum. Provide copper equipment ground bus. When indicated on drawings, provide panel with neutral busbar sized for at least 100% of phase busbars.
- D. Provide a nameplate for each panel indicating its designation (such as "DISTRIBUTION PANEL DP-1" in 1/4 inch high letters) as indicated on drawings, the voltage system (such as "208/120V-3PH-4W"), and origin of feeder (such as "FED FROM SWBD MSB"). Provide a nameplate for each circuit breaker unit indicating the load served (such as "PANEL A").

#### 2.05 PANELS

- A. Panelboards for lighting and miscellaneous power shall be dead front safety type equipped with bolt-on circuit breakers of the numbers and sizes shown on the drawing and herein. Multiple pole breakers shall have an internal common trip. Tie handles will not be permitted. Breakers serving multi-wire branch circuits passing through fixtures shall be multiple pole breakers, even if indicated as single pole on the drawings. Breakers shall have a SWD listing. Provide GFCI type breakers as indicated on drawings and when required by Code.
- B. General Electric type AQ, Westinghouse type PR1, or equal for 208/120V, and General Electric type AE, Westinghouse type PR2, or equal for 480/277V.

- C. Busbars shall be copper or aluminum, braced for the available short circuit current, and have the capacities required on the plans by not less than the ampere frame size of the protective device supplying the panelboard. All panelboards shall be equipped with a copper equipment ground bus. When indicated in panel schedule, provide an oversized neutral comprised of split neutral busbars and each half shall have the same ampere rating as the phase busbars and be equipped with double lugs. Termination lugs shall be rated for 75°C.
- D. Each branch circuit shall have a permanently fixed number. Provide a typewritten directory mounted in a metal frame with a clear plastic front cover on the inside of the cabinet door giving the circuit number and a complete description of all outlets controlled by each panel circuit breaker. Consult Architect for correct room and/or furniture system module designation scheme (not necessarily those shown on drawings). Mark spaces with pencil only.
- E. Provide a nameplate for each panelboard indicating the panel designation (such as "PANEL 3A") as indicated on drawings, the voltage system (such as 208/120V-3PH-4W"), and origin of feeder (such as "FED FROM SWBD MSA").
- F. Special panelboard construction or features shall be as shown on drawings. For circuit breakers, switches, contactors and other equipment to be included as an assembled part of the panelboard, refer to the paragraph where those items are specified.
- G. Refer to Paint, Finishes and Colors subsection.
- H. Doors shall be fastened to trim with concealed hinges and provided with flush type combination catch and lock. All locks shall be keyed alike. Mount floor standing panelboards on a base. Refer to Concrete Equipment Bases subsection.

## 2.06 MINI-POWER CENTERS

- A. Mini-power centers shall be three phase units 480 volt primary and 120/208 volt; 3 phase secondary.
- B. All transformers shall have a minimum of 2-5% full capacity primary taps below normal and shall be rated 115°C temperature rise above 40°C maximum ambient. All insulating materials are to be in accordance with current NEMA ST20 standards for a 185°C UL component recognized insulation system.
- C. Transformers are to be encapsulated using a sand-epoxy resin mixture to provide maximum protection against moisture, dust and corrosive environments.
- D. Package power supplies shall include integrally mounted and wired primary and secondary circuit breakers in accordance with the National Electric Code.
- E. Branch circuit breakers shall be plug-on type, Square D type "Q0", or equal. Trip indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF".
- F. A hinge access door shall be provided which maintains itself in the open position when desired and which has padlock provisions.
- G. Mini-power centers shall be U.L. listed.

## 2.07 SAFETY SWITCHES

- A. Externally operated switches shall be quick-make, quick-break, with interlocking cover. Switches and enclosures shall be heavy duty type. Provide Class J rejection clips if used with fuses. Switches used in indoor dry conditions shall have NEMA 1 enclosures. Switches exposed to wet or outdoor conditions shall have NEMA 3R enclosures.
- B. Provide a nameplate on each disconnect switch as specified in "NAMEPLATES". Nameplate shall show item controlled, voltage, phase, and source of power.
- C. In case of a substitution of material or equipment protected, the disconnect, fuses, circuit conductors, conduit, and feeder circuit breaker shall be resized accordingly and provided at no additional cost.

## 2.08 FUSES

- A. Fuses for feeders and motor branch circuits shall be time delay current limiting type with 200,000 AIC. The time delay shall be minimum 10 seconds at 500% load for 600A or smaller fuses and 4 seconds at 500% load for larger than 600A. 600 ampere and smaller fuses shall be Class J. Fuses larger than 600A shall be Class L.
- B. Upon Owner's acceptance of the electrical distribution system, provide the Architect with spare fuses and cabinet to hold same as follows: Three fuses of each rating installed 601 amperes and larger, 10% of each type and rating installed 0 to 600 amperes but not less than three of each. Fuses shall be provided in a 24" x 30" 6"D spare fuse cabinet where noted on the drawings. Fuse cabinet shall have hinged, key lockable door with engraved nameplate. Written documentation shall be submitted by the Contractor and approved by the Owner Representative prior to completion of project.
- C. Fuse sizes shown on drawings are for reference only based on specified mechanical/plumbing equipment. Final determination of fuse sizes shall be made by Contractor based on approved mechanical/plumbing equipment nameplate ratings.
- D. Fuses shall be installed so that the rating can be clearly read from the front of the open switch without removing the fuse.

## 2.09 MOTOR STARTERS – INDIVIDUALLY MOUNTED

- A. Starters used in indoor dry conditions shall have NEMA 1 enclosures. Starters exposed to wet or outdoor conditions shall have non-metallic NEMA 3R enclosures. Provide a nameplate for each starter unit indicating the load served (such as "EXH. FAN E-1").
- B. Magnetic: Shall be combination starters. Provide with a motor circuit protector unless specifically indicated on drawings to be with a fused switch. Provide accessories (start/stop pushbuttons, H.O.A. switches, red neon pilot running lights, interlock contacts, control transformer, etc.) as required by this Division and by Division 15 – Mechanical plans and specifications. Confirm ratings (watts, volts, amps, etc.) with mechanical control system supplier prior to ordering of components. Each starter unit shall, as a minimum, have in its cover an overload reset, hand-off-auto selector switch and a red pilot running light. Equip each starter unit with the number of auxiliary N.O. and N.C. contacts required but at least four N.O./N.C. convertible contacts. Equip each starter with an overload relay in each under grounded wire. Select overload ratings to match the characteristics of the motors actually installed. Control voltage shall be per mechanical documents except for external mechanical control circuits. Source shall be unit transformers in each starter compartment. Transformer shall be 100 VA minimum rating.

- C. Manual: Toggle type with integral melting alloy overload protection. Where shown on the drawings, fractional horsepower motors shall have toggle type manual starters with thermal overload protection in each phase. Provide a padlocking-off device on the handle, and where the motor is out of sight of the switch provide a pilot light in the cover to indicate switch is closed.

#### 2.10 LIGHTING CONTACTORS

- A. 20 amp, mechanically held with coil clearing feature or electrically held as indicated on drawings.
- B. Separate enclosures shall be NEMA 1 for interior dry locations and NEMA 3R for exterior or damp locations, or as otherwise shown on the drawings, with finish as required for panelboards.
- C. Contractors shall be selected and rated for the proper voltage, loads, and type of duty. Mounting shall be either in a separate compartment of the panelboard cabinet, or where wall space permits, in a separate cabinet adjacent to the panelboard. Compartments and cabinets shall conform to the specification for panelboard cabinet work and shall be sized for adequate mounting and wiring space.
- D. New contactors or relays for existing switchboards or panelboards shall be by the same manufacturer as those existing in the board or by the manufacturers listed above.

#### 2.11 DISCONNECTS

- A. Acceptable manufacturers shall be Square D, General Electric, and Westinghouse or ITE.
- B. All switches shall be heavy-duty type, externally operated, quick-make, quick-break, rated 600 volts or 240 volts as required, with the number of poles and ampacity as noted. All switches for motors shall be HP rated. Switches shall have NEMA-type 1 enclosures. Switches located where exposed to outdoor conditions shall have NEMA type 3R/12 enclosure. Switches generally shall be fused except where noted to be non-fused on the drawings.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Installation shall conform to the requirements of the NEC and to the manufacturer's shop drawings and mounting instructions. Equipment base for floor standing equipment shall have an adequate number of anchor bolt holes to put the base in direct contact shear and tension with the mounting surface at all anchor bolt locations. Refer to Section 26 05 00 Common Work Results for Electrical, for seismic restraint requirements.
- B. Disconnects:
  - 1. Mount all switches to structure or U-channel support. U-channel supports shall be cleaned and painted to prevent rust.
  - 2. Switches shall be accessible with proper clearances in front per NEC 110-16.

#### 3.02 GROUNDING

- A. Grounding and bonding shall be in accordance with Section 26 05 26 Grounding.

END OF SECTION 26 20 00

SECTION 26 27 26 – WIRING DEVICES

PART 1 – GENERAL

1.01 SUMMARY

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division One, apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Wiring Devices, as indicated on the drawings, specified herein, or reasonably required to complete the work.

1.02 SUBMITTALS

- A. Comply with requirements of Section 01 33 00 – SUBMITTALS.
- B. Material List and Manufacturers' Literature.

1.03 CUTTING AND PATCHING

- A. Perform drilling, cutting, and patching of the general construction work whether existing or new, which may be required for the installation. Patch with the same materials, workmanship and finish as the original work and accurately match all surrounding work. Such work shall be done by a craftsman accredited in the applicable trade and be acceptable to the Owner's representative.

PART 2 - PRODUCTS

2.01 WIRING DEVICES

- A. Acceptable Manufacturers: Pass & Seymour, Hubbell, Leviton or equal.
- B. Switches:
  - 1. AC general use snap switches shall be toggle handle, quiet operating, specification grade UL listed and verified to meet Federal Specification W-S-896 and NEMA WD-1 heavy duty tests.
  - 2. Switches shall be rated 120/277 volts 20 amps. Switches shall have HP ratings as follows: 20 amp rating – 1 HP @ 120V, 2 HP @ 240V.
  - 3. Toggle handle color shall be selected by Architect.
  - 4. Switches shall be constructed with oversized silver-cadmium alloy contacts, permanent lubrication, and binding head screws suitable for #10 AWG wire. Connection shall be made by wrapping the wire around the screw or tightening a screw clamp. Push-in type connections are not acceptable. Switches may have built-in pigtail connection in lieu of screw connection. Switches shall have means for grounding.
  - 5. Switches shall be Pass & Seymour #20AC1, Hubbell #CSB1201, or equal.
  - 6. Keyed and momentary contact switches, required but not listed, shall be of the same manufacturers and identical quality as those listed above.
- C. Receptacle:
  - 1. Receptacle outlets shall be Specification Grade or Hospital Grade Safety type of standard NEMA configuration.



2. General receptacle outlets shall be 20 amp, 125 volt, 2 pole, 3 wire. The attachment screw shall have an automatic grounding clip. A green grounding screw shall be mounted on the bridge which shall run around the back of a break and impact resistant plastic body. The bridge shall be securely locked to the body. Outlets shall be UL listed and verified to meet Federal Specification WC 596 and NEMA WD 1 heavy duty performance tests. Contacts shall be extra heavy duty copper alloy or bronze double wipe type. Outlets shall have binding head screws suitable for #10 AWG wire. Connection shall be made by wrapping the wire around the screw or tightening a clamp. Push-in type connections are not acceptable. Outlets may have built-in pigtail connection in lieu of screw connection.
3. Receptacle outlet fronts shall be selected by Architect.
4. Outlets shall be Pass & Seymour SG-63-H, Hubbell HBLSG63 or equal.
5. Ground fault circuit interrupter (GFCI) outlets shall be specification grade 20 amp duplex grounding receptacle suitable for mounting in a standard outlet box. A ground current of 5 milliamps ± shall trip the circuit open in less than 1/30 second. There shall be a test button and a reset button on the front. Each GFCI outlet shall be tested after installation and results of the test submitted in writing. GFI receptacles shall be Pass & Seymour #2091-SHG, Hubbell #GF5352 or equal.
6. Industrial type outlets shall be by Crouse-Hinds Appleton, or Russellstoll, and shall be rated for the amps, volts, poles, and wires indicated on the drawings.
7. Special power outlets, not listed above, shall be standard NEMA configuration as noted on drawings and shall be of at least equal grade and quality to those listed above.

D. Device plates:

1. Acceptable Manufacturers: Pass & Seymour, Hubbell, Leviton or equal.
2. Plates for flush wiring devices, including telephone outlets, shall be smooth, stainless steel in all lab areas. All other areas shall be white nylon. Wiring devices and device plates shall be the same manufacturer.
3. Provide switch and device plates with engraved designations wherever called for by words, set off in quotation marks near a switch location, or by symbol. If inscription is not detailed on drawings, request it from the Owner's representative. Engraving shall be in 1/8-inch high block type letters filled with black enamel.
4. Finish plates for all surface mounted devices shall be pressed steel galvanized. Cover plates for flush mounted junction boxes in finished areas shall be selected by Owner's representative.
5. For surface interior outlet and junction boxes of the pressed steel knockout type, use 1/2-inch raised galvanized steel plates for devices and flat galvanized steel for blank plates.
6. Provide a plate for each outlet, receptacle, switch, device and box.
7. Each switch, receptacle, device, etc. which is installed in an outlet box with coverplate shall have the panel and circuit number engraved with 1/8" high black filled lettering at top of coverplate.
8. Plates for exterior roof locations shall be metallic with gaskets and shall have lockable/unlockable weatherproof spring loaded covers for devices, Pass & Seymour #WPH-26 or equal.
9. Plates for exterior wall locations shall be key lockable, heavy duty hinged type. Pass & Seymour #4600-26 or equal.
10. Ganged devices shall have gang plates exactly matching the arrangement and quantity of devices. All plates shall fit the box perfectly with no field modification necessary. Plates on surface mounted boxes shall not overhang the box. All plates shall be manufactured specifically for the type of outlet, device and box to which they are applied.

E. Electronic Time Switches:

1. Time switches shall be Wattstopper LP series or equal with relays as required to operate circuits as indicated on plans. The switch shall have a system time clock with astronomic feature and a group switching option.

PART 3 - EXECUTION

3.01 INSTALLATION OF OUTLETS

- A. All outlets, wall switches or wiring devices may be located within a radius of twelve feet from original location shown on plans at no additional charge to the Owner if such request is made prior to installation of the rough-in for the item.
- B. Accurately place outlet boxes independently and securely fasten to the structure and, in concealed work, provide with plaster rings and set flush with finished surface of walls or ceilings.
- C. Coordinate the location and mounting heights of wall-mounted receptacles, fire alarm and signal devices switches with casework, shelving, furniture, and other equipment shown on Architectural and Interiors drawings and Americans with Disabilities Act (ADA), UBC, ANSI, and all other applicable codes governing the project. Conflict between electrical and architectural drawings shall immediately be brought to the attention of the Owner's representative for resolution before the installation of the devices.
- D. Outlet and junction boxes for interior use shall be galvanized, one-piece pressed or welded steel, knockout type, except where other types of boxes are indicated or specified. In masonry or concrete construction waterproof boxes manufactured for that purpose shall be used. Plastic, fiber or composition boxes will not be permitted.
- E. Protectively cover all devices, outlet boxes, cabinets, etc., before plastering and painting.

END OF SECTION 26 27 26

SECTION 26 50 00 – LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Lighting, as indicated on the drawings, specified herein, or reasonably required to complete the work.

1.02 SUBMITTALS

- A. Comply with requirements of Section 01 33 00 – SUBMITTALS.
- B. Material List including reflector type and each type of lamp and ballast.
- C. Catalog cuts for each fixture and pole including complete photometric data in IES format.
- D. Electronic ballast warranty.

1.03 GENERAL REQUIREMENTS

- A. Provide U.L. listed and labeled lighting fixtures complete with lamps at light outlets indicated on the drawings. Each fixture shall bear the U.L. label, and shall comply with Code Requirements. Exterior fixtures shall be U.L. approved for damp locations in soffits and for wet locations elsewhere and shall be so labeled.
- B. Design (including the frames) of recessed fixtures shall be compatible with the ceiling construction. Verify the type of ceiling and suspension method prior to ordering fixtures. Architect's favorable review of the shop drawings for both the ceiling system and the lighting fixtures, with "No Exception Taken" or "Approved" on the Architect's stamp, will not relieve the Contractor of the ceiling/lighting fixture compatibility requirement.
- C. Fixtures are listed and described in the Fixture Schedule and in the following paragraphs. Fixture catalog numbers are to be used as a guide only and shall be understood to be followed by the words "except as modified by the total fixture description both text and pictorial". Provide accessories, features and adaptations necessary to meet the requirements of the description.
- D. If the fixture designation is omitted from a light outlet, assume a fixture of the type used in similar areas in preparing the bid. Confirm type with Architect prior to ordering.

1.04 ACCEPTABLE MANUFACTURERS

- A. Electromagnetic Advance, Valmont Electric
- B. Ballasts Jefferson, Universal, Sola or equal
- C. Electronic Ballasts Magnetek-Universal, Motorola, EBT or equal
- D. Lamps Sylvania, General Electric, N.A. Phillips, Osram or equal

1.05 LAMP REPLACEMENT

- A. Replace lamps which burn out after Owner's use or acceptance of the project (or of an area in the case of beneficial occupancy).
- B. Lamps (except incandescent) which burn out with 120 days.
- C. Incandescent lamps which burn out after usage which is less than 80% of rated life.

## PART 2 - PRODUCTS

### 2.01 FINISH

- A. Treat surface mounted fixtures and exposed trim of recessed fixtures with a rust-inhabitant process. This process shall be Bonderlite or Oakite Crysoat or equal zinc phosphate bonding process. Refer to PAINT, FINISHES AND COLORS sections.

### 2.02 OPTICAL SYSTEMS

- A. Lighting fixtures for use with HPS lamps shall have the optical system specifically designed for a clear HPS lamp of the wattage indicated.

### 2.03 BALLAST WIRING

- A. Where multiple level switching of fluorescent fixtures is indicated on the drawings, wire ballasts for symmetrical grouping of lamps. For example in three lamp tandem fixtures, two inner and four outer lamps shall be switch controlled.

### 2.04 EXIT SIGN FIXTURES

- A. Emergency exit sign fixtures with illumination by LED's (Light Emitting Diodes), fully enclosed within aluminum housing and providing even illumination of letters through an optical diffuser to meet or exceed requirements of NFPA Life Safety Coded 101 and the OSHA code. The power supply shall be dual input 120/277V 60 Hz. All components shall be solid state, with surge protection and short circuit protection and each LED shall be individually driven such that failure of one will not affect another.

### 2.05 BALLASTS

- A. Emergency battery pack ballasts for fluorescent lighting fixtures shall consist of an automatic power failure device, test switch, pilot light, and fully automatic solid-state charge in a self-contained power pack furnished by the fixture manufacturer as an integral part of the fixture. Charger shall be either trickle, float, constant current or constant potential type, or a combination of these. Battery shall be no maintenance nickel cadmium type with capacity to supply power to one lamp for each fixture for 90 minutes minimum. Unit shall be capable of operating a dead fluorescent lamp.
- B. Fluorescent HID ballasts and emergency battery pack ballasts shall be guaranteed for 3 years.

### 2.06 LAMPS

- A. Provide lamps as listed below unless specifically indicated otherwise in the Lighting Fixture Schedule.

- B. Incandescent General Service Lamps: Inside frosted, standard life, 130V.

### 2.07 FLUORESCENT LAMPS

- A. Compact Fluorescent; 3500K degree color for interior locations.
- B. 40 watt “Biax”; 3500K.
- C. Rapid-start lamps; 3500K.
- D. High Intensity Discharge (HID) Lamps:
  - 1. Metal halide light fixtures that utilize a horizontal lamp configuration shall be provided with a clear lamp rated for horizontal operation.
- E. Each type of lamp by only one manufacturer color consistency.

#### 2.08 LIGHT TRANSMITTING PLASTICS

- A. All plastic shall be 100% virgin acrylic. Pattern #12 lenses shall be minimum .125-inch thick overall with .08-in. prism depth.

#### 2.09 LIGHTING CONTROL SYSTEM – MOTION SENSING

- A. Motion sensing lighting control system shall be installed where shown to switch lighting fixtures ON when a room or area is entered and OFF after a preset time delay after sensing no motion or occupancy.
- B. System shall consist of motion sensor units, switchpacks, wiring, and miscellaneous electrical hardware. Ceiling mounted sensing and switchpack units shall be manufacturers by Novitas, Watt-Stopper or equal. Wall switch type unit shall be provided by Novitas or equal.

#### 2.10 EMERGENCY INVERTER SYSTEMS

- A. Furnish and install interruptible 3600 VA emergency AC inverter system manufactured by Chloride, Emerg-Lite, Exide, Lithonia, or equal capable of serving a 2400 VA 277 volt 60 Hz connected load for a period of 90 minutes to 87.5 percent of output voltage. System shall be listed to UL Standard 924.
- B. The entire system, including inverter, battery charger, transfer equipment and battery, shall be designed for maximum reliability in emergency service and shall be designed with modular construction for easy field replacement. System transfer time to emergency mode shall be no more than 50 milliseconds. All solid-state components shall be conservatively rated. Electronics shall carry a one year warranty.
- C. The system shall be designed to operate from 277 volt 1-phase 60 Hz input voltage and supply the normally ON loads at 277 volts single phase 60 Hz.
- D. Supply normally ON loads at 277 volts single-phase 60 Hz and also supply normally OFF loads at 120 volts single-phase 60 Hz, at Building.
- E. Inverter:
  - 1. The DC to AC inverter shall be of the solid state type with ferroresonant output transformer to provide 120/277 volt 1-phase 60 Hz sine wave output such that the output voltage is regulated to within  $\pm 5\%$  from 10% load to full load at unity power factor and the frequency is regulated within  $\pm 1$  Hz. Total harmonic distortion of the output shall be approximately 5% at full resistive load and nominal input.

2. System efficiency shall be at least 90% in the standby mode to minimize power consumption. Inverter efficiency shall be greater than 80% in emergency mode to insure maximum utilization of battery capacity and to minimize space.
3. To minimize power consumption, inverter shall not operate continuously; however, low level logic stage shall operate when AC supply is available to minimize interruption of power to load.
4. Self-protective features shall include short circuit protection, failsafe startup, automatic low battery shutdown, reverse input polarity protection and 5-minute operation at 130% of unit rating. The input power and control circuitry shall be separately fused.

F. Charger:

1. The battery charger shall be a solid state, constant voltage, current limited device incorporating internal red visual indicators to signal float and high charge mode. Charger shall be equipped with timed automatic equalize charge to periodically bring batteries up to full capacity. Charger shall be capable of recharging batteries in accordance with the requirements of UL 924.

G. Battery:

1. The Battery shall be sized to power the fully-loaded inverter for 90 minutes in accordance with UL requirement and shall be sealed, maintenance free lead calcium requiring no addition of water during service life. Expected service life shall be 10 years and warranty shall be a total of 10 years consisting of 1 years full replacement plus 9 years prorated replacement.

H. Controls:

1. Instrumentation and controls shall be suitable to determine that the system is operating in a satisfactory manner. As a minimum, these shall include utility power indicator, inverter bypassed indicator, DC battery voltmeter, AC output voltmeter, DC battery ammeter, system test switch, high-charge indicator.

I. Enclosure:

1. System electronics shall be enclosed in a free standing, 14-gauge, NEMA 1 sheet steel enclosure painted with key-lock hinged doors. Battery enclosures of similar construction shall be supplied as required. All electronics shall be mounted on easily removable modules with quick disconnect inter-wiring. All potentially hazardous components shall have safety covers and be properly marked with tags to indicate safe handling.

J. Accessories:

1. Inverter units shall be provided with output circuit breakers.
2. AC ammeter.

### PART 3 – EXECUTION

#### 3.01 FIXTURE MOUNTING

- A. Provide fixture supports. Design (including the frames) of recessed fixtures shall be compatible with the ceiling construction. Verify the type of ceiling and suspension method prior to ordering fixtures. Architect favorable review of the shop drawings for both the ceiling system and the lighting fixtures, with “No Exception Taken” or “Approved” on the Owner’s representative’s stamp, will not relieve the Contractor of the ceiling/lighting fixture compatibility requirement.

- B. Mount pendant fixtures at the heights indicated on the drawings, unless otherwise directed by Architect.
- C. Verify the ceiling or wall construction, voltage, and the mounting requirements of each fixture and provide plaster frames, special flanges, concrete pour housings, boxes, brackets, adapters, hangers, stems, canopies, special ballasts or lenses, and other materials necessary to properly purchase and mount the fixture.
- D. Attach surface fixtures mounted on accessible panel type suspended ceilings to a main runner with a positive clamping device made of minimum 12 gauge steel. Rotational spring catches will not be permitted. Mount fixtures which are on combustible ceilings on spacers as required by Code unless Code approved for mounting directly on ceiling.
- E. See “Seismic Restraints” under Section 26 05 00 – Common Work Results for Electrical.

### 3.02 FIXTURE LOCATIONS

- A. Locate fixtures installed in Mechanical Equipment Rooms after ducts and piping are in place for maximum working space coverage. Connect with exposed conduit. Provide conduit with conduit fittings for boxes and offsets. Support fixtures from the structure independently of ducts or piping.

### 3.03 FIXTURE INSTALLATION

- A. Provide outlet boxes for recessed fixtures in a manner approved by the Code. In non-accessible ceilings provide access to junction boxes, ballast, transformers, and battery packs through fixture apertures: no access panels in ceiling. Provide appropriately temperature rated insulation for branch wires to recessed fixtures.
- B. Install lighting fixtures securely, level, plumb, aligned, and in straight rows. Lighting fixtures must be installed so they do not shift during relamping or adjustment.
- C. Recessed Fixtures:
  - 1. Supports: Provide seismic clips and bracing per Code. Refer to Section 26 05 00 Common Work Results for Electrical.
  - 2. Holes for Recessed Fixtures
  - 3. Minimum-width fixture trims are specified for this project. Cut holes to follow fixture housing exactly so no gaps will be visible after trims are installed.
  - 4. Round holes in acoustic tiles: Pre-cut in center of tiles, using adjustable-diameter cutter on slow-speed drill press.
  - 5. Install bottom of housing aligned with finished ceiling.
  - 6. Keep ceiling insulation at least 3” away from fixture.
  - 7. Install trims after painting of spaces. Install trims tightly, with no gaps, or light leaks. For exterior fixtures provide seals and gasketing to prevent insect entry into the fixtures. If soffits recessed fixtures are not available with a sealed housing, provide effective gasketing for the lens and for the lens trim/soffit surface interface.
- D. Ceiling-Mounted and Pendant Fixtures:
  - 1. Supports: Provide support for outlet boxes so fixtures can be installed securely, including seismic supports and restraints per Code.
  - 2. Fixture weight less than 50 lb. at each suspension point: hang from strap or stud on outlet box.

END OF SECTION 26 50 00



SECTION 26 56 00 – EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Lighting, as indicated on the drawings, specified herein, or reasonably required to complete the work.

1.02 SUBMITTALS

- A. Comply with requirements of Section 01 33 00 – SUBMITTALS.
- B. Material List including reflector type and each type of lamp and ballast.
- C. Catalog cuts for each fixture and pole including complete photometric data in IES format.

1.03 GENERAL REQUIREMENTS

- A. Provide U.L. listed and labeled lighting fixtures complete with lamps at light outlets indicated on the drawings. Each fixture shall bear the U.L. label, and shall comply with Code Requirements. Exterior fixtures shall be U.L. approved for damp locations in soffits and for wet locations elsewhere and shall be so labeled.
- B. Fixtures are listed and described in the Fixture Schedule and in the following paragraphs. Fixture catalog numbers are to be used as a guide only and shall be understood to be followed by the words “except as modified by the total fixture description both text and pictorial”. Provide accessories, features and adaptations necessary to meet the requirements of the description.
- C. If the fixture designation is omitted from a light outlet, assume a fixture of the type used in similar areas in preparing the bid. Confirm type with Architect prior to ordering.

1.04 LAMP REPLACEMENT

- A. Replace lamps which burn out after Owner’s use or acceptance of the project (or of an area in the case of beneficial occupancy).

PART 2 - PRODUCTS

2.01 FINISH

- A. Treat surface mounted fixtures and exposed trim of recessed fixtures with a rust-inhabitant process. This process shall be Bonderlite or Oakite Cryscoat or equal zinc phosphate bonding process. Refer to PAINT, FINISHES AND COLORS sections.

2.02 LAMPS

- A. Provide lamps as listed the Lighting Fixture Schedule.

PART 3 - EXECUTION

3.01 Installation

- A. Install as per manufacturer's recommendation and as detailed in drawings

END OF SECTION 26 56 00

SECTION 27 10 00 STRUCTURED CABLING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. The provisions of Section 26 05 00 Basic Electrical Materials and Methods, apply to this section as if fully repeated herein.
- C. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Structured Cabling, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to, the following:
  - 1. Copper Communications Cabling.
  - 2. Copper Telephone Cabling.
  - 3. Fiber Optic Communications Cabling.
  - 4. Coax Television Cabling.
  - 5. Audio/Visual Cabling.
- D. This section specifies standards of materials and execution in the provision of wiring, cable and related terminations to be provided under the work of Division 27 Sections. Refer to the requirements of such sections for the functional requirements of systems to be provided using the materials and methods of this section, as well as the additional standards, material, and execution specific to each section.

1.02 SUBMITTALS

- A. In addition to the requirements of Division 01, submit as applies, all materials for review arranged in same order as Specifications, individually reference to specification section, paragraph and contract drawing number. Conform in every detail as applies to each referencing section.
- B. Coordination Drawings: Prepare coordination drawings in accordance with the provisions in Section 01 30 00.
- C. Make each specified submittal as a coordinated package complete with all information specified herein. Incomplete or uncoordinated submittals will be returned with no review action.
- D. Progress Schedule: Include duration and milestones for at least the following:
  - 1. All submittals specified.
  - 2. Shipment to site.
  - 3. Installation.
  - 4. Field testing.
- E. Manufacturer's Product Data:
  - 1. List of Material. For each item include:
    - a. Manufacturer.
    - b. Model number.
    - c. Listing: UL or none.

d. Quantity.

F. Shop Drawings:

1. Floor Plans indicating rough-in, mounting height, conduit size, wire type, and wire fill.
2. Sections/Elevations with mounting location reference.
3. Enlarged plans as necessary.
4. Wire run sheets (if used) indicating wire number, source, designation, signal type, and wire type.
5. Provide full size front elevation details of patch bays with layout and text designations.

G. Samples: Samples for review by the Architect of all finishes/materials which will be visible to the public, including but not limited to:

1. Receptacles and controls with associated trim plate.
2. For other items, provide at least 2" x 2" sample.

H. Shop and Project Site Test Reports:

1. Schedule: Submit test reports in timely manner relative to project schedule such that the representative of the Architect may conduct verification of submitted test data without delay of progress.
2. Shop test report: Submit prior to shipping completed equipment racks to project site.
3. Project site test report: Submit the following system completion and prior to and as condition precedent to acceptance review and testing of the work of this section.
4. Pull tension study: The contractor shall furnish a cable pull tension study for all inter-building cables greater than 200 feet in length or containing more than 180 degrees of bend in the conduit path. The study shall utilize a three dimensional computer generated model of the conduit path. The study shall calculate pull tensions, sidewall pressures, and jamming ratios as a minimum. The study shall be performed in both pull directions and shall recommend a pull direction that generates lesser tension. The pull tension study shall be submitted and reviewed by the District prior to the installation of any cables.
5. Content: Include at least:
  - a. Time and date of test.
  - b. Personnel conducting test.
  - c. Test equipment, including serial and date of calibration.
  - d. Test object.
  - e. Procedure used.
  - f. Results of test – numerical or graphical presentation.

1.03 QUALITY ASSURANCE

Comply with the requirements of Division 01 and the following:

- A. Company: Work of each section in this Division shall be performed by an installer who has at least eight (8) years direct experience with the devices, equipment and systems of the type and scope specified herein, and who has fully staffed and equipped maintenance and repair facility, and who is licensed to perform work of this type in the project jurisdiction. Raceway installation shall be performed by a licensed C-10 contractor. All other work shall be performed by parties licensed to perform such work.
- B. Personnel: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section. Supervisors shall have at least eight (8)

years direct experience in similar work. Installation and maintenance personnel shall have at least five (5) years direct experience in similar work.

- C. Designated supervisor: Provide a designated supervisor present and in responsible charge in the fabrication shop and on the project site during all phases of installation and testing of the work of this section. This supervisor shall be the same individual through the execution of the work unless illness, loss of personnel, or other circumstances reasonably beyond the control of the contractor intervene.
- D. Coordination: Coordinate the work of this section with the work of all other sections. Comply with Division 01.
- E. Verification: Verify dimensions and conditions at the project site. Submit any conflicts in a timely manner for resolution.
- F. Project site installation and testing: Install as specified herein. Perform specified adjustment procedures. Provide test equipment and test according to procedures specified herein. Request verification of project site test in a timely manner.
- G. Verification of submitted test data: Re-test in presence of designated representatives of the Architect at reasonable mutual convenience. Provide services of the designated supervisor and an additional technician familiar with work of this section. Provide all test equipment. Provide complete set of latest stamped, actioned submittals of record for reference. Provide complete set of shop and project site test reports, as applies. Provide a complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- H. Reference/Project record documents: At all times when the work is in progress, maintain at the workplace, fabrication shop or project site as applies, a complete set of the latest stamped, actioned submittals of record for reference. Also maintain a separate, clean undamaged set for preparation of Project Record Documents. Also maintain at the workplace a complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- I. Schedule: Comply with the project schedule. Make all submittals specified herein in a timely manner. Failure to make timely submittals complete as specified herein is considered to be lack of substantial progress of the work of this section.
- J. Deliver all equipment, devices and material required for the work of this section and install, test and ready all work for acceptance testing at least 14 days prior to the completion date for the associated area of the project.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

##### A. Shipping conditions:

- 1. All cable shall be shipped on reels with a drum diameter at least 13 times the diameter of the cable.

##### B. Storage:

- 1. Retain factory cable protection until installation. Supplement with heavy gauge plastic sheeting if factory protective membrane is pierced prior to installation. Tape ends and seams water and dust tight.
- 2. Equipment and cable shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

#### 1.05 REGULATORY REQUIREMENTS

- A. Codes and regulations: Perform all work in strict accordance with all applicable Federal, State, County and City codes, regulations, and ordinances.

#### 1.06 APPLICABLE STANDARDS & AGENCIES

- A. Conform to the following:

1. CEC California Electrical Code.
2. NFPA National Fire Protection Association.
3. CBC California Building Code.
4. UL Underwriters Laboratories.
5. ANSI American National Standards Institute.
6. ASTM American Society for Testing Materials.
7. EIA Electronic Industries Association
8. ICEA Insulated Cable Engineers Association.

#### 1.07 PERFORMANCE STANDARDS

- A. Voice and Data Category 6, to TIA/EIA Category 6.

- B. Fiber Optic Cabling:

1. Optical Budget: For specified cabling, not more than 2 dB over the cabling manufacturer's specified loss for that same length plus .4dB for each connector and 0.3 dB for each splice measured at 1300 nm.
2. Bandwidth: 500 MHz/km or per cable specification, whichever is more restrictive.

#### 1.08 OPERATING AND MAINTENANCE DATA

- A. Manuals: In addition to the requirements of Division 01, submit two (2) additional sets. Submit in three (3) post binders (not ring binders) with tabs.

- B. Include:

1. Index.
2. Reduced set of system record drawings.
3. Maintenance and spare parts schedule.
4. Equipment manuals. Collate alphabetically by manufacturer. Provide manufacturer's original operation, instruction and service manuals for each item. For each set, provide manufacturer's original printed copies only. Photocopies not acceptable.

- C. As-Built drawings:

1. Quantity: Three (3) sets.
2. Format: CAD and PDF files on CD-ROM or DVD-ROM.
3. Content: All drawings required under "Shop Drawings". Show "as installed" condition. Where room designations according to project permanent signage differ from construction designations in the contract documents, show both designations.

- D. Warranty certificates: Comply with Division 01.

#### 1.09 WARRANTY SERVICE

In addition to provisions of Division 01, provide the following:

- A. Warranty: Warrant all of the work of this section to be free from defects in materials and workmanship for a period of twelve (12) months from the date of District acceptance.
- B. Response time: Provide a qualified technician familiar with the work at the project site within twenty-four (24) hours after receipt of a notice of malfunction. Provide the District with the telephone number attended eight (8) hours a day, five (5) days a week, to be called in the event of a malfunction.
- C. Off-site service: Conduct all warranty repairs and services at the project site, unless in violation of manufacturer's standard product warranty. Provide substitute systems, equipment, and/or devices acceptable to the District for the duration of off-site repairs. Provide transportation for substitute and/or test systems, equipment, devices, materials, parts and personnel to and from project site.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Copper Communications Cabling
  - 1. Cable and Termin.: CommScope <http://www.commscope.com>
  - 2. Approved Equal
- B. Copper Telephone Cabling
  - 1. Cable and Termin.: Superior Essex <http://www.superioressex.com>
  - 2. Approved Equal
- C. Fiber Optic Communications Cabling
  - 1. Cable and Termin.: CommScope <http://www.commscope.com>
  - 2. Approved Equal
- D. COAX Television Cabling
  - 1. Cable: CommScope <http://www.commscope.com>
  - 2. Approved Equal
- E. Audio/Visual Cabling
  - 1. Cable: Belden, Inc. <http://www.belden.com>
  - 2. Termination: Ortronics, Inc. <http://www.ortronics.com>
  - 3. Approved Equal

### 2.02 COPPER COMMUNICATIONS CABLING: CAT6 UTP

- A. Horizontal Cabling
  - 1. Model: CommScope Uniprise UltraMedia #75N4-BL
  - 2. Rating: CMP rated.
  - 3. Spares: Provide (1) spare cable to each audio-video system.
- B. Termination
  - 1. MDF/IDF Rooms: CommScope Uniprise UNP610-48.

- a. 48 port patch panel with rear cable manager.
2. Wall/Ceiling Plate: CommScope Uniprise UNF-MFM-4P-WH.
3. Floor Mount: CommScope Uniprise UNF-FR106-4P-WH-WH.

C. Patch Cords

1. 7 foot: Uniprise UNC6-BL-7F, RJ45 to RJ45.
  - a. Quantity: As required.
  - b. Color: As per District Information Systems Department.
2. 10 foot: Uniprise UNC6-BL-10F, RJ45 to RJ45.
  - a. Quantity: As required.
  - b. Color: As per District Information Systems Department.

2.03 COPPER TELEPHONE CABLING

A. Inter Building Backbone: CAT3 UTP

1. Model: Superior Essex 24 AWG from existing MDF to new IDF.
2. Rating: OSP rated.
3. Conductors: 25 pair.

B. Intra Building Backbone: CAT3 UTP

1. None This Project.

C. Horizontal Cabling: CAT6UTP

1. Model: CommScope Uniprise UltraMedia #75N4-BL.
2. Rating: CMP rated.
3. Conductors: 4 pair.

D. Termination

1. MDF/IDF: CommScope Uniprise CAT 3 patch panel.
  - a. 24 port patch panel with rear cable manager.
  - b. Rack mounted (wall mounted C-5 blocks with 110 termination not permitted).
  - c. Provide labels and clear label holders.
  - d. Provide lightning protection at both ends prior to termination on patch panel.
2. Wall Plate: CommScope Uniprise UNF-WL4-1P-ST.
  - a. 1 port stainless steel wall phone faceplate.

2.04 FIBER OPTIC COMMUNICATIONS CABLING

A. Inter Building Backbone

1. Innerduct: Provide (1) 1-1/2" OSP rated between existing MDF and new IDF.
2. 12 Strand Cable: Provide (1) CommScope Uniprise Z-012-DS-5K-FSUAQ.



- a. Mode: Multimode.
  - b. Rating: OFNR rated.
3. 4 Strand Cable: Provide (1) CommScope Uniprise Z-004-DS-8W-FUSBK.
- c. Mode: Singlemode.
  - d. Rating: OFNR rated.

B. Intra Building Backbone

- 1. None This Project.

C. Fiber Termination

- 1. Cable Ends: LC-type connectors.
- 2. Housing: CommScope Uniprise
  - a. LC-type connectors mounted inside LC Duplex connector panels within the Closet Connector Housing.
  - b. 4U sized housing at MDF.
  - c. 1U sized housing at IDF's.

2.05 COAX TELEVISION CABLING

A. Inter Building Backbone

- 1. Model: CommScope Uniprise RG-11.
- 2. Rating: OSP Rated.
- 3. Termination: Coiled at each end for future use.

B. Intra Building Backbone

- 1. None This Project.

2.06 AUDIO/VISUAL CABLING

A. HDMI Cable

- 1. Model: Belden 23.5 AWG shielded twisted bonded-pair.
- 2. Rating: CMP rated.
- 3. Conductors: 19.
- 4. Termination: Ortronics OR-KSHDMI, keystone, fog white.
- 5. Termin. Face Plate: Ortronics OR-40300158, 3 module single gang, fog white.

B. RGB Cable

- 1. Model: Belden #1218B.
- 2. Rating: CMP rated.
- 3. Conductors: 12 (6 pairs).
- 4. Termination: Ortronics OR-60900313, female DB-15 with crimp pins, fog white.
- 5. Termin. Face Plate: Ortronics OR-40300158, 3 module single gang, fog white.

C. S-Video Cable

1. Model: Belden # 7700A.
2. Rating: CMP rated.
3. Conductors: 2.
4. Termination: Ortronics OR 60900225, 4 pin, 110 connected, fog white.
5. Termin. Face Plate: Ortronics OR-40300158, 3 module single gang, fog white.

D. Composite Video Cable

1. Model: Belden #1695A shielded coax.
2. Rating: CMP rated.
3. Conductors: 1.
4. Termination: Ortronics OR-60900235, triplex RCA/phono, 110 connected, fog white.
5. Termin. Face Plate: Ortronics OR-40300158, 3 module single gang, fog white.

E. Audio Cable

1. Model: Belden 14 AWG, shielded.
2. Rating: CMP rated.
3. Conductors: 4.
4. Termination: Ortronics OR-60900235, triplex RCA/phono, 110 connected, fog white.
  - a. Provide 1/8" mini jack inputs as per drawings.
5. Termin. Face Plate: Ortronics OR-40300158, 3 module single gang, fog white.

F. Speaker Wire

1. Model: Belden 16 AWG, shielded.
2. Rating: CMP rated.
3. Conductors: 2.

PART 3 - EXECUTION

3.01 GENERAL

- A. All system cabling and terminations to be installed in accordance with the manufacturer's instructions and as shown.
- B. All necessary interconnections, services, and adjustments required for a complete and operable system shall be provided. All installation work must be done in accordance with the safety requirements set forth in the general requirements of ANSI C2 and NFPA 70.

3.02 TEST EQUIPMENT

- A. Provide at least one (1) each of the following items or approved functional equivalents for the duration of each test:
  1. Level 11, Cat 6 Cable Pair Tester.
  2. Time Domain Reflectometer.
  3. True RMS Audio Digital Volt-Phm-Millimeter.
  4. Tone Test Sets.
  5. Optical Power Meter.
  6. Site Portable Communication Systems.

7. Any other items of equipment or materials required to demonstrate conformance with the contract documents.
8. Voice Cabling Plant Tester – Capable of detecting shorts, opens, reversals, mis-wiring and crosstwists.
9. All testing equipment models to be approved by District Information Services Department.

### 3.03 WIRE AND CABLE INSTALLATION

- A. All wire and cable shall be continuous and splice-free for the entire length of run between designated connections or terminations.
- B. Identify data and voice cables distinctly by using different color overall jacket or insulation.
- C. Verify that all raceways have been de-burred and properly joined, coupled and terminated prior to installation of cables. Verify that all raceway is clear of foreign matter and substances prior to installation of wire or cable.
- D. Inspect all conduit bends to verify proper radius. Comply with Code for minimum permissible radius and maximum permissible deformation.
- E. Apply a chemically inert lubricant to all wire and cable prior to pulling in conduit. Do not subject wire and cable to tension greater than that recommended by the manufacturer. Use multi-spool rollers where cable is pulled in place around bends. Do not pull reverse bends.
- F. Provide a box loop for all wire and cable routed through junction boxes or distribution panels. Provide tool formed thermal expansion loops at cable at manholes, handholes and at both sides of all fixed mounted equipment. Cable loops and bends shall not be bent at a radius greater than that recommended by the manufacturer.
- G. Cable Tray Exposed Cable Installation: To conform to EIA/TIA 569, 10.4. Provide at least twice the listed separation for all high intensity EMF sources (including but not limited to motors, transformers, and copiers).
- H. Placement: Do not obscure access to access doors, hatches, air dampers, valves, cable trays, junction boxes, pull boxes or similar areas of access.
- I. All wall and floor penetrations to have pipe sleeves.

### 3.04 SIGNAL POLARITY AND COLOR CODE CONVENTION

- A. RJ45 – Per EIA 568B.

### 3.05 WIRING AND CABLE INSTALLATION, SUPPLEMENTAL OUTSIDE PLANT PROCEDURES

- A. Cable Pulling: Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Accumulate cable slack at each manhole or junction box where space permits by training cable around the interior to form one complete loop. Maintain minimum allowable bending radii forming such loops. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnips into outdoor pedestals or other enclosures. Cable with tape shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

- B. Cables in Manholes and Handholes. Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. In existing manholes and handholes where new ducts are to be terminated or where new cables are to be installed, locate the existing installation of cables, cable supports and grounding as required for a uniform installation with cables carefully arranged and supported. Install cables at middle and bottom of cable racks, leaving top space opening or future cables, except as otherwise indicated for existing installations.

- 1. No splices allowed in manholes, provide continuous inter building cabling.

- C. Cable tags in manholes and handholes. Provide cable markers (or tags) per TIA/EIA 606.

### 3.06 WIRING PRACTICE

- A. Coordinate insulation displacement (quick connect) terminal devices with wire size and type. Comply with manufacturer's recommendations. Make connections with automatic impact type tooling set to recommended force.
- B. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections. No wire or cable shall be supported by a connection point. Provide service loops where harnesses of different classes cross, or where hinged panels are to be interconnected.
- C. Correct any and all of the following unacceptable wiring conditions:
  - 1. Deformed, brittle, or cracked insulation.
  - 2. Torn or worn cable jacket.
  - 3. Excessively scored cable jackets.
  - 4. Insulation shrunken or stripped further than 1/8" away from the actual point of connection within a connector, or on a punch block.
  - 5. Ungrommeted, unbushed, or uninsulated wire or cable entries.
  - 6. Deformation or improper radius of wire or cable.

### 3.07 VOICE AND DATA CABLING WIRING PRACTICE

Conform to the following in addition to the general requirements above:

- A. Limit cable bends to a minimum radius of eight (8) times the cable diameter except where otherwise noted herein.
- B. Box Loops: At data cabling, form circular radius bends of eight (8) times the cable diameter minimum. Up to two (2) flat bends of 90 degrees or less are permitted in any single cable run where necessary to accommodate field wiring conditions. Flat bends exceeding 90 degrees will not be accepted.
- C. Receptacle Loop: At the receptacle, a single bend of 90 degrees or less and a 1 inch radius shall be permitted subject to the cable manufacturer certification of such an installation meeting Category 6 requirements. Contractor to field verify the performance of the proposed installation in a mockup using the proposed cabling, jacks, raceway and listed test equipment prior to proceeding.
- D. Secure: Tie wraps to be hand (not tool) tightened.
- E. Run Lengths:
  - 1. Station, Horizontal, and Closet Links:

- a. Horizontal distribution runs (including vertical portions) shall not exceed 90 meters (295 feet) from station outlet to the associated communications closet.
  - b. Station cabling runs to be three (3) meters (10 feet) or less.
  - c. Closet distribution wiring not to exceed 6 meters (19.5 feet).
- F. Lightning Protection: Provide solid-state lightning protection system for all incoming voice copper cable pairs. Lightning protection system shall allow for the easy removal/replacement of protector units. All incoming copper voice cable pairs shall be cross connected from the lightning protection system to a rack-mounted patch panel.

### 3.08 LABELING

#### A. Cable and MDF/IDF Labeling:

1. The Contractor shall label and document all components of the installed data cable infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
2. All label printing will be machine generated using indelible ink ribbons or cartridges. Self laminating labels will be used on cable jackets, appropriately sized to the outside diameter of the cable, and placed within view at the termination point on each end. Outlet labels will be the manufacturer's labels provided with the outlet assembly.
3. Faceplates:
  - a. Each faceplate shall be labeled as follows:
    - i. At the top of the faceplate: The name of the MDF/IDF (or name provided by the District Information Systems Department) where the destination's cable is located.
    - ii. If more than one rack is located in the MDF or IDF room, a rack number shall also be included in the label.

#### MDF/IDF Closets:

- a. Each telecommunications rack shall be labeled with the MDF/IDF labeling from the drawings or as provided by the District Information Systems Department.
- b. If more than one rack is located in the room, each rack shall be numerically labeled in sequence starting from the left and working around to the right.
- c. Data Patch Panel:
  - i. Each port of each patch panel shall be labeled with the cable destination's room number. One label can be used to cover a group of ports as long as a marker is used to indicate a change in room numbering.
  - ii. Each patch panel row shall be labeled with an alpha character indicating that row. Labeling shall go in sequence from the top to bottom.
- d. Phone Patch Panel:
  - i. Each port shall be labeled in numeric sequence from left to right. Since phone cables come in groups of 25, the 25th pair shall not be used. Therefore, the start of the next row will start with the next available number. For Example: 26, 51, 76, etc.
  - ii. Each patch panel group shall be labeled with the MDF/IDF of the cable's destination.

### 3.09 TESTING

#### A. Category 6 System:

1. Test and report on each segment separately, including station cabling, horizontal distribution (each segment, if multiple) and telecommunications closet wiring.
2. Test each collective segment as a whole.
3. Note exceptions to Category 6 standards, as applies. Remedy and retest.
4. Submit copy of final results on CD-ROM or DVD-ROM organized by circuit number, consistent with circuit numbering scheme used in preparing submittal drawings and in labeling receptacles and terminations.

### 3.10 EQUIPMENT ENCLOSURE (RACK) AND EQUIPMENT BACKBOARD FABRICATION

- A. Combustible material, other than incidental trim of indicated equipment, is prohibited within equipment racks.
- B. Provide a permanent label on the front of each equipment rack including the rack designation, and the circuit breaker number and associated electrical distribution panel designation servicing same.
- C. Access shall not require demounting or de-energizing of equipment. Install access covers, hinged panels, or pull-out drawer to insure complete access to terminal and interior components.
- D. Fasten removable covers containing any wired component with a continuous hinge along one side, with associated wiring secured and dressed to provide an adequate service loop. Provide an appropriate stop lock to hold all hinged panels and drawers in a serviceable position.
- E. Provide permanent labels for all equipment and devices. Where possible, fasten such labels to the rack frame or to blank or vent panels, which will remain in place when active equipment is removed for possible service.
- F. At jackfields, provide service loop to permit removal of jackfields from rack sufficient to conveniently access all jack contact for routine cleaning and maintenance. Organize the service loop and harness such that reasonable reconnection of jacks and jack normals is possible without cutting apart the harness.
- G. Coordinate the design and execution of wire harnessing of multi-bay rack ensembles with conditions of delivery to installation locations at project site, and with the requirement herein for the test of the completely wired system in the shop prior to delivery to the project site. Organize the wiring harnesses such that they will fold within one shippable unit without risk of damage, or provide polarized multipin connectors and related interconnect systems as specified elsewhere herein.

### 3.11 ACCEPTANCE REVIEW AND TESTING PROCEDURES

Complete all work of this section. Submit test report. Submit review copies of Operating and Maintenance Manuals, less reduced set of Record Drawings. Notify the Architect in writing that the work of this section is complete and fully complies with the contract documents. Request acceptance and review testing. The representative of the Architect will conduct verification of submitted test data and otherwise direct testing and adjustment of this work. These procedures may be performed at any hour of the day or night as required by the representative of the Architect to comply with the project schedule and avoid conflict with these procedures from possible ongoing work of other sections. Provide all specified personnel and equipment at any time without claim for additional cost or time.

- A. Personnel: Provide services of the designated supervisor and additional technicians familiar with work of this section. Provide quantity of technicians as required to comply with project schedule.
- B. In addition, provide the following:

1. All testing equipment.
2. Complete set of the latest stamped, actioned submittals of record for reference.
3. Complete set of shop and project site test reports.
4. Complete set of manufacturer's original operation, instruction and service manual for each equipment item for reference.

- C. Demonstrate complete operation of all systems.
- D. Make adjustments as directed by the representative of the Architect.
- E. Correct all items that fail to comply with contract documents, as reasonably determined by the representative of the Architect, in a timely manner.

### 3.12 FIBER TESTING

- A. Fiber – in accordance with the current TIA standard ANSI/TIA/EIA-568-B.3 specifications for fiber optic cable.
  1. All test results and fiber lengths shall be provided to District Information Systems Department.

### 3.13 CLOSEOUT

- A. Punch List: Perform any and all remedial work, at no claim for additional cost or time. Where required, retest and submit test report. Notify Architect of completion of punch list.
- B. Portable Equipment: Furnish all portable equipment and spares to the designated representative of the District, along with complete documentation of the materials presented. Where applicable, furnish portable equipment in the original manufacturer's packing.
- C. Submit Operating and Maintenance Data Manuals.
- D. Submit Project Record Documents.
- E. If applicable, replace construction locks with permanent locks. Transmit keys to District.
- F. Conduct specified training.
- G. Submit warranty dated to run from date of District's acceptance of the work.

### 3.14 DISTRICT'S RIGHT TO USE EQUIPMENT

Acceptance of the work of this section will be after completion of corrections and adjustments required by the Punch List which results from acceptance review and testing of the completed installation. The District reserves the right to use equipment, material, and services provided as part of the work of this section, prior to acceptance, without incurring any obligation to accept any equipment or completed systems until all punch list work is complete and all systems comply with the contract documents, or accept any claim for additional cost or time.

END OF SECTION 27 10 00

SECTION 27 11 00 COMMUNICATIONS EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. The provisions of Section 16011, “General Requirements, Electrical”, and Section 16050, “Basic Electrical Materials and Methods”, apply to this section as if fully repeated herein.
- C. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Communications Equipment, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to, the following:
  - 1. Equipment enclosure systems including relay racks, wall mount racks, and accessories.
  - 2. Uninterruptable power systems and surge suppressors.
  - 3. BDF and IDF switches.
  - 4. Grounding.
  - 5. Wireless LAN.
- D. This section specifies common standards of materials and execution for the work of Division 16700 Sections. Refer to the requirements of such sections for the functional requirements of systems to be provided using the materials and methods of this section, as well as the additional standards, material, and execution specific to each section.

1.02 SUBMITTALS

- A. In addition to the requirements of Division 01, submit as applies, all materials for review arranged in same order as Specifications, individually referenced to specification section, paragraph and contract drawing number. Conform in every detail as applies to each referencing section.
- B. Submit all drawings on sheets of the same size.
- C. Make each specified submittal as a coordinated package complete with all information specified herein. Incomplete or uncoordinated submittals will be returned with no review action.
- D. Progress Schedule: Include duration and milestones for at least the following:
  - 1. All submittals specified.
  - 2. Completion of equipment buyout.
  - 3. Completion of equipment receipt at fabrication shop.
  - 4. Shop fabrication.
  - 5. Shop testing.
  - 6. Shipment to site.
  - 7. Installation.
  - 8. Field testing.
  - 9. District’s first event date.
- E. Manufacturer’s Product Data:
  - 1. List of Material. For each item include:



- a. Manufacturer.
  - b. Model number.
  - c. Listing: UL or none.
  - d. Quantity.
2. Manufacturer's Product Data Sheets: In sequence of List of Materials, data sheet for each item, including all accessories, marked for proposed product.
- F. Shop Drawings:
1. Floor Plans indicating rough-in, mounting height, conduit size, wire type, and wire fill.
  2. Sections/Elevations with mounting location reference.
  3. Enlarged plans and mounting details as necessary.
  4. Wire run sheets (if used) indicating wire number, source, designation, signal type, wire type, and operating level or voltage (if applicable).
  5. Provide full size front elevation details of patch bays with layout and text designations.
- G. Samples: Samples for review by the Architect of all finishes/materials which will be visible to the public, including but not limited to:
1. Receptacles and controls with associated trim plate.
  2. For other items, provide at least 2" x 2" sample.
- H. Samples: Samples for review by the Architect of all finishes/materials which will be visible to the public, including but not limited to:
1. Receptacles and controls with associated trim plate.
  2. For other items, provide at least 2" x 2" sample.
- I. Shop and Project Site Test Reports:
1. Schedule: Submit test reports in timely manner relative to project schedule such that the representative of the Architect may conduct verification of submitted test data without delay of progress.
  2. Shop test report: Submit prior to shipping completed equipment racks to project site.
  3. Project site test report: Submit the following system completion and prior to and as condition precedent to acceptance review and testing of the work of this section.
  4. Content: Include at least:
    - a. Time and date of start of burn-in.
    - b. Time and date of test.
    - c. Personnel conducting test.
    - d. Test equipment, including serial and date of calibration.
    - e. Test object.
    - f. Procedures used.
    - g. Results of test – numerical or graphical presentation.

### 1.03 QUALITY ASSURANCE

Comply with the requirements of Division 01 and the following:

- A. Company: Work of each section in this Division shall be performed by an installer who has at least five (5) years direct experience with the devices, equipment and systems of the type and scope specified herein, and who has a fully staffed and equipped maintenance and repair facility, and who is licensed to perform work of this type in the project jurisdiction. Raceway installation shall be

performed by a licensed C-10 contractor. All other work shall be performed by parties licensed to perform such work.

- B. Personnel: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section. Supervisors shall have at least five (5) years direct experience in similar work. Installation and maintenance personnel shall have at least three (3) years direct experience in similar work.
- C. Designated supervisor: Provide a designated supervisor present and in responsible charge in the fabrication shop and on the project site during all phases of installation and testing of the work of this section. This supervisor shall be the same individual through the execution of the work unless illness, loss of personnel, or other circumstances reasonably beyond the control of the contractor intervene.
- D. Coordination: Coordinate the work of this section with the work of all other sections. Comply with Division 01.
- E. Verification: Verify dimensions and conditions at the project site. Submit any conflicts in a timely manner for resolution.
- F. Project site installation and testing: Install as specified herein. Perform specified adjustment procedures. Provide test equipment and test according to procedures specified herein. Request verification of project site test in a timely manner.
- G. Verification of submitted test data: Re-test in presence of designated representatives of the Architect at reasonable mutual convenience. Provide services of the designated supervisor and an additional technician familiar with work of this section. Provide all test equipment. Provide complete set of latest stamped, actioned submittals of record for reference. Provide complete set of shop and project site test reports, as applies. Provide a complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- H. Reference/Project record documents: At all times when the work is in progress, maintain at the workplace, fabrication shop or project site as applies, a complete set of the latest stamped, actioned submittals of record for reference. Also maintain a separate, clean undamaged set for preparation of Project Record Documents. Also maintain at the workplace a complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- I. Schedule: Comply with the project schedule. Make all submittals specified herein in a timely manner. Failure to make timely submittals complete as specified herein is considered to be lack of substantial progress of the work of this section.
- J. Deliver all equipment, devices and material required for the work of this section and install, test and ready all work for acceptance testing at least 14 days prior to the completion date for the associated area of the project unless specifically instructed otherwise by the Architect
- K. Shop Fabrication and Testing: Assemble and fully wire equipment racks and equipment backboards at a fabrication shop off the project site. Burn in for not less than one hundred sixty-eight (168) hours. Perform specified adjustment procedures. Provide test equipment and test according to procedures specified herein. Request verification of shop test in timely manner. Following verification of shop test and when installation locations are ready as specified herein, deliver such equipment racks and equipment backboards to the project site and install.
- L. Temporary Equipment: Provide and operate, without claim for additional cost or time, temporary equipment and/or systems to provide reasonably equivalent function, as determined by the Architect, in lieu of the work of this section which is incomplete or found not in conformance with the Contract

Documents as of seven (7) days prior to the completion date. Provide such temporary equipment until acceptance of the work of this section. Thereafter, remove such temporary equipment.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

Comply with requirements of Division 01 and the following:

- A. Deliver materials in manufacturer's original undamaged packages or in bulk packing which provides equivalent protection.
- B. Store packaged materials off ground or slab in manner to protect them from elements, especially moisture damage.
- C. Deliver equipment to associated equipment rooms at the project site when major work of all other sections is complete, equipment room ventilation is operating with clean filters in place, the area is clean and free from airborne contaminants, and continuing work of other trades will not produce airborne contaminants or permit transport of such airborne contaminants to the equipment rooms.

#### 1.05 REGULATORY REQUIREMENTS

- A. Codes and regulations: Perform all work in strict accordance with all applicable Federal, State, County and City codes, regulations, and ordinances.
- B. Unlisted Equipment: Certain equipment specified herein does not bear listing by Underwriters Laboratories (UL). Such equipment is specified herein only where no equipment is known to exist bearing such listing which will perform the function required by the District. In such case, apply for field inspection of such equipment. Pay cost of such inspection.

#### 1.06 APPLICABLE STANDARDS & AGENCIES

- A. Conform to the following:
  - 1. CEC California Electrical Code.
  - 2. NFPA National Fire Protection Association.
  - 3. CBC California Building Code.
  - 4. UL Underwriters Laboratories.

#### 1.07 OPERATING AND MAINTENANCE DATA

- A. Manuals: In addition to the requirements of Division 01, submit two (2) additional sets. Submit in three (3) post binders (not ring binders) with tabs.
- B. Include:
  - 1. Index.
  - 2. Systems operating instructions.
  - 3. Maintenance and spare parts schedule.
  - 4. Equipment manuals. Collate alphabetically by manufacturer. Provide manufacturer's original operation, instruction and service manuals for each equipment item. For each set, provide manufacturer's original printed copies only. Photocopies not acceptable.
  - 5. Reduced set of system record drawings.
  - 6. Key schedule.
- C. As-Built drawings:

1. Quantity: Three (3) sets.
2. Format: CAD and PDF files on CD-ROM or DVD-ROM.
3. Content: All drawings required under "Shop Drawings". Show "as installed" condition. Where room designations according to project permanent signage differ from construction designations in the contract documents, show both designations.

D. Warranty certificates: Comply with Division 01.

#### 1.08 WARRANTY SERVICE

In addition to provisions of Division 01, provide the following:

- A. Warranty: Warrant all of the work of this section to be free from defects in materials and workmanship for a period of twelve (12) months from the date of District acceptance.
- B. Response time: Provide a qualified technician familiar with the work at the project site within twenty-four (24) hours after receipt of a notice of malfunction. Provide the District with the telephone number attended eight (8) hours a day, five (5) days a week, to be called in the event of a malfunction.
- C. Off-site service: Conduct all warranty repairs and services at the project site, unless in violation of manufacturer's standard product warranty. Provide substitute systems, equipment, and/or devices acceptable to the District for the duration of off-site repairs. Provide transportation for substitute and/or test systems, equipment, devices, materials, parts and personnel to and from project site.

#### PART 2 - PRODUCTS

##### 2.01 ACCEPTABLE MANUFACTURERS

A. Equipment Enclosures and Accessories

1. Chatsworth Products, Inc. <http://www.chatsworth.com>
2. APC <http://www.apc.com>
3. Approved Equal

B. Uninterruptable Power Systems and Surge Suppressors

1. Tripp Lite <http://www.tripplite.com>
2. APC <http://www.apc.com>
3. Approved Equal

C. BDF and IDF Switches

1. Hewlett-Packard <http://www.hp.com>
2. Approved Equal

D. Wireless LAN

1. Brocade Communications Systems, Inc. <http://www.brocade.com>
2. Approved Equal

E. Grounding

1. Chatsworth Products, Inc. <http://www.chatsworth.com>
2. Approved Equal

F. Audio-Visual Equipment Enclosures and Accessories

1. Middle Atlantic Products <http://www.middleatlantic.com>

2.02 EQUIPMENT ENCLOSURES AND ACCESSORIES

A. Rack Cabinet: Wall Mounted, swing out frame for rear access

1. Model: Chatsworth #11792-725.
2. Size: 73.5" x 19" x 25".
3. Color: Black.
4. Accessories: Ground lug.
5. Quantity: As per drawings.
6. Mounting: Bolt to wall.

B. Relay Rack: open side and back

1. Model: Chatsworth #55053-703.
2. Size: 84" x 19" x 3".
3. Color: Black.
4. Accessories: Chatsworth #41050-719 rack base dust cover, splice kit, ground lug.
5. Quantity: As per drawings.
6. Mounting: Bolt to floor.

C. Wire Management

1. Vertical 4.4" Wide: Chatsworth #30091-703, MCS single sided.
2. Vertical 6" Wide: Chatsworth #30092-703, MCS single sided.
3. Horizontal 2U: Chatsworth #30530-719.

2.03 UNINTERRUPTABLE POWER SYSTEMS AND SURGE SUPPRESSORS

A. Uninterruptable Power System (UPS): BDF Data Room

1. Model: Tripp-Lite 3000RTXL3UHV.
2. Outlets: (6) NEMA 6-15/20R, (2) NEMA L6-20R.
3. Power Capacity: 3000 VA/2400 Watt.
4. Quantity: As per drawings.
5. Mounting: Rack mounted.
6. Rack Unit Size: 3U.
7. Furnished/Installed: Contractor Furnished / Contractor Installed.

B. Surge Suppressors: Data Room

1. Model: Tripp-Lite IBAR12-20ULTRA.
2. Outlets: 12.
3. AC Suppression: 1280 joules.
4. Quantity: As per drawings.
5. Mounting: Rack mounted.
6. Rack Unit Size: 1U.
7. Furnished/Installed: Contractor Furnished / Contractor Installed.

C. Surge Suppressors: AV Control System/Lectern

1. Model: Tripp-Lite ISOBAR8ULTRA.
2. Outlets: 8.
3. AC Suppression: 2350 joules.
4. Quantity: Provide (1) per cabinet/lectern.
5. Mounting: Wall mount inside cabinet.
6. Rack Unit Size: N/A.
7. Furnished/Installed: Contractor Furnished / Contractor Installed.

## 2.04 BDF AND IDF SWITCHES

### A. BDF Switches

1. Model: ProCurve E5412-92G-PoE+/2XG-SFP+ v2 zl (J9532A).
2. Quantity: 1 per BDF data room.
3. 10GbE Module: HP J9536A.
  - a. Quantity: Included with base switch.
  - b. Ports (each): 2 port 10GbE SFP+ with 20 port 10/100/1000 PoE+.
  - c. Transceiver: Provide (2) HP 10GbE X2-SC LR Optic (J8437A).
  - d. Connection: Fiber intraconnect cabling.
4. GBIC Module: HP ProCurve J9308A.
  - a. Quantity: 1.
  - b. Ports (each): 4 open mini-GBIC slots with 20-port 10/100/100 PoE+.
  - c. Transceiver: Provide (4) HP ProCurve 1Gb (J4859C).
  - d. Connection: Fiber intraconnect cabling.
5. Copper Module: HP ProCurve J9534A.
  - a. Quantity: Provide (4) total: (3) included with base switch, (1) additional.
  - b. Ports (each): 24 port 10/100/1000 PoE+.
  - c. Connection: RJ-45.
6. Power Supply: Redundant HP 1500W PoE+ zl (J9306A).
  - a. Quantity: (2) Included with base switch.
7. Management: HP ProCurve Manager Plus Software (J9174A).
  - a. License: Provide additional 50 device license (J9173A).
8. Mounting: Rack mounted.
9. Rack Unit Size: 7U.
10. Furnished/Installed: Contractor Furnished / Contractor Installed.

### B. IDF Switches

1. None This Project.

### C. Security

1. Model: Palo Alto Networks PAN-PA-2050.
2. Quantity: 1 per BDF data room.
3. Ports (each): 16 port 10/100/1000, 4 port Gigabit SFP.

4. Throughput:
  - a. Firewall: 1 Gbps.
  - b. Threat Prev.: 500 Mbps.
  - c. IPSec VPN: 300 Mbps.
5. Sessions: 250,000 max.
6. Mounting: Rack mounted.
7. Rack Unit Size: 2U.
8. Subscription: (3) years prepaid.
  - a. Threat Prevention (PAN-PA-5020-TP-3YR).
  - b. URL Filtering (PAN-PA-5020-URL-3YR).
  - c. Premium Support (PAN-SVC-PREM-5020-3YR).
9. Bypass Switch: Datacom Systems Inc. DURAstream 1G (DS-4000-4BT).
  - a. Rack mount 1U.
10. Furnished/Installed: Contractor Furnished / Contractor Installed.

## 2.05 WIRELESS LAN

### A. Wireless LAN Switch

1. Model: Brocade RFS7000.
2. Access Points: 256 “thin” 802.11a/b/g Brocade Mobility 300 access points.
3. Wired LAN Ports: 4 x 10/100/1000 Cu/SPF.
4. Security: BR-RFS7000-L-ADSEC, advanced security upgrade.
5. AP License: BR-RFS7000-L-AP128, starter license for 128 access point radios.
6. Quantity: Provide (1) per Data Room.
7. Mounting: Rack mounted.
8. Rack Unit Size: 1U.
9. Furnished/Installed: Contractor Furnished / Contractor Installed.

### B. Radio Access Point: Dual-radio

1. Model: Brocade 7131N (BR-AP7131N66S40).
2. Standards: 802.11a/b/g/n.
3. Antennas: Integrated.
4. Coverage: Multiple overlapping blanket.
5. Quantity: As per drawings.
6. Mounting: Above ceiling.
7. Rack Unit Size: N/A.
8. Furnished/Installed: Contractor Furnished / Contractor Installed.

### C. Radio Access Point: Tri-radio

1. Model: Brocade 7131N (BR-AP7131N66S78).
2. Standards: 802.11a/b/g/n.
3. Antennas: Provide exterior wall mounted.
4. Coverage: Multiple overlapping blanket.
5. Quantity: As per drawings.
6. Mounting: Above ceiling.
7. Rack Unit Size: N/A.

8. Furnished/Installed: Contractor Furnished / Contractor Installed.

D. Security

1. Model: Brocade AirDefense SV-1250-P-1.
2. Quantity: Provide (1) per WLAN switch.
3. Mounting: Rack mounted.
4. Rack Unit Size: 1U.
5. Licensing:
  - b. Intrusion Prevention: AD-SNFL-P-1, Enterprise base Wireless Intrusion Prevention.
  - c. Forensic Analysis: AD-FESN-P-1, Advanced Forensic Analysis.
  - d. Troubleshooting: AD-ATSN-P-1, Advanced Troubleshooting.
  - e. Quantaty: Provide (40) licenses of each.

6. Furnished/Installed: Contractor Furnished / Contractor Installed.

2.06 GROUNDING

A. Busbar: Wall Mounted

1. Model: Chatsworth Standard #10622-010.
2. Size: 10" ground busbar with min. 4 AWG ground wire.
3. Quantity: Provide (1) per Data room.

2.07 AUDIO-VISUAL EQUIPMENT ENCLOSURES AND ACCESSORIES

A. 4-Post Rack

1. Model: Middle Atlantic #CFR-14-18.
2. Size: 19.25" x 18" x 25.44" (14 rack units).
3. Color: Black.
4. Accessories: Provide (3) Middle Atlantic #UTR1, 1U-rack mount.
5. Quantity: Provide (1) per AV system.
6. Mounting: Inside Lectern or Mobile Instructor Table.

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform the work of this section in accordance with acknowledged industry and professional standards and practices and the procedures specified herein.
- B. Furnish and install (herein, "provide") all materials, devices, components, and equipment required for complete, operational systems.

3.02 TEST EQUIPMENT

- A. Furnish, store and maintain test equipment for both routine and acceptance testing of the work of this section:
  1. Provide all items of equipment or materials required to demonstrate conformance with the contract documents.



3.03 FINISHES

- A. Finishes and materials for equipment mounting in furniture or casework, and in general any item or component herein which is visible shall adhere to the following:
  - 1. Finish shall be as directed by the Architect.
  - 2. Wooden speaker back boxes and baffles shall be painted flat black if not otherwise finished or stained.

3.04 EQUIPMENT ENCLOSURE (RACK) AND EQUIPMENT BACKBOARD FABRICATION

- A. Combustible material, other than incidental trim of indicated equipment, is prohibited within equipment racks.
- B. Access shall not require demounting or de-energizing of equipment. Install access covers, hinged panels, or pull-out drawers to insure complete access to terminals and interior components.
- C. Provide permanent labels for all equipment and devices. Where possible, fasten; such labels to the rack frame or to blank or vent panels which will remain in place when active equipment is removed for possible service.
- D. At jackfields, provide service loop to permit removal of jackfields from rack sufficient to conveniently access all jack contacts for routine cleaning and maintenance. Organize the service loop and harness such that reasonable reconnection of jacks and jack normals is possible without cutting apart the harness.

3.05 SYSTEMS PERFORMANCE TESTING AND ADJUSTING PROCEDURES

- A. Upon completion of the installation of all equipment in an area, perform the following tests and record results. Verify safe and proper operation of all components, devices, or equipment, establish nominal signal levels within the systems and verify the absence of extraneous or degrading signals. Make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable. Submit test report. Correct all non-conforming conditions prior to requesting acceptance review testing. Perform at least the following procedures:
  - 1. Mechanical Verification:
    - a. Integrity of all support provisions.
    - b. Absence of debris of any kind, tools, etc.
  - 2. Power and Isolated Ground Verification:
    - a. Isolation of Isolated Ground System from raceway and related ground.
    - b. Grounding of devices and equipment. Integrity of signal and technical power system ground connections.
    - c. Proper provision of power to devices and equipment.
  - 3. Signal Wiring Verification:
    - a. Integrity of all insulation, shield terminations and connections.
    - b. Routing and dressing of wire and cable.
    - c. Continuity, including conformance with wire designations on running sheets, field and shop drawings.
    - d. Absence of ground faults.

e. Polarity.

4. Use the proper sequence of energizing systems to minimize the risk of damage. Energize.

### 3.06 ACCEPTANCE REVIEW AND TESTING PROCEDURES

- A. Complete all work of this section. Submit test report. Submit review copies of Operating and Maintenance Manuals, less reduced set of Record Drawings. Notify the Architect in writing that the work of this section is complete and fully complies with the contract documents. Request acceptance review testing. The representative of the Architect will conduct verification of submitted test data, and otherwise direct testing and adjustment of this work. These procedures may be performed at any hour of the day or night as required by the representative of the Architect to comply with the project schedule and avoid conflict with these procedures from possible ongoing work of other sections. Provide all specified personnel and equipment at any time without claim for additional cost or time.
- B. Personnel: Provide services of the designated supervisor and additional technicians familiar with work of this section. Provide quantity of technicians as required to comply with the project schedule.
- C. In addition, provide:
  - 1. Set of hand and power tools appropriate for performance of adjustment of and corrections to this work. Include spare wire and connectors and specified tooling for application.
  - 2. Ladders, scaffolding and/or lifts as required to access high devices.
  - 3. All test equipment.
  - 4. Complete set of latest stamped, actioned submittals of record for reference.
  - 5. Complete set of shop and project site test reports.
  - 6. Complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- D. Demonstrate complete operation of all systems and equipment including portable equipment.
- E. Adjust as directed by the representative of the Architect.
- F. Correct, in a timely manner, any work that fails to comply with the contract documents as reasonably determined by the representative of the Architect.

### 3.07 CLOSEOUT

- A. Punch List: Perform any and all remedial work, at no claim for additional cost or time. Where required, retest and submit test report. Notify Architect of completion of punch list.
- B. Portable Equipment: Furnish all portable equipment and spares to the designated representative of the District along with the complete documentation of the materials presented.
- C. Submit Operating and Maintenance Data manuals.
- D. Submit project record documents.
- E. Conduct specified training.
- F. Submit warranty, dated to run from the date of acceptance of the work.

### 3.08 DISTRICT'S RIGHT TO USE EQUIPMENT

- A. Acceptance of the work of this section will be after completion of corrections and adjustments required by the Punch List which results from acceptance review and testing of the completed installation. The District reserves the right to use equipment, material, and services provided as part of the work of this section, prior to acceptance, without incurring any obligation to accept any equipment or completed systems until all punch list work is complete and all systems comply with the contract documents, or accept any claim for additional cost or time.

END OF SECTION 27 11 00

SECTION 27 51 26 ASSISTIVE LISTENING SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. The provisions of Section 26 00 00 General Electrical Provisions, and Section 26 05 00 Basic Electrical Materials and Methods, apply to this section as if fully repeated herein.
- C. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Assistive Listening System equipment, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to, the following:
  - 1. Stationary Built-in Radio Frequency (RF) System.
  - 2. Stationary Built-in Infrared (IR) System.
  - 3. Portable Infrared (IR) System.
- D. This section specifies standards of materials and execution in the provision of wiring, cable and related terminations to be provided under the work of Division 27 Sections. Refer to the requirements of such sections for the functional requirements of systems to be provided using the materials and methods of this section, as well as the additional standards, material, and execution specific to each section.

1.02 SUBMITTALS

- A. In addition to the requirements of Division 01, submit as applies, all materials for review arranged in same order as Specifications, individually referenced to specification section, paragraph and contract drawing number. Conform in every detail as applies to each referencing section.
- B. Coordination Drawings: Prepare coordination drawings in accordance with the provisions in Section 01 30 00.
- C. Make each specified submittal as a coordinated package complete with all information specified herein. Incomplete or uncoordinated submittals will be returned with no review action.
- D. Progress Schedule: Include duration and milestones for at least the following:
  - 1. All submittals specified.
  - 2. Shipment to site.
  - 3. Installation.
  - 4. Field testing.
- E. Manufacturer's Product Data:
  - 1. List of Material. For each item include:
    - a. Manufacturer.
    - b. Model number.
    - c. Listing: UL or none.
    - d. Quantity.

2. Manufacturer's Product Data Sheets: In sequence of List of Materials, data sheet for each item, including all accessories, marked for proposed product.
- F. Samples: Samples for review by the Architect of all finishes/materials which will be visible to the public, including but not limited to:
1. Receptacles and controls with associated trim plate.
  2. For other items, provide at least 2" x 2" sample.
- G. Shop and Project Site Test Reports:
1. Schedule: Submit test reports in timely manner relative to project schedule such that the representative of the Architect may conduct verification of submitted test data without delay of progress.
  2. Project site test report: Submit the following system completion and prior to and as condition precedent to acceptance review and testing of the work of this section.
  3. Content: Include at least:
    - a. Time and date of test.
    - b. Personnel conducting test.
    - c. Test equipment, including serial and date of calibration.
    - d. Test object.
    - e. Procedures used.
    - f. Results of test – numerical or graphical presentation.

### 1.03 QUALITY ASSURANCE

Comply with the requirements of Division 01 and the following:

- A. Company: Work of each section in this Division shall be performed by an installer who has at least five (8) years direct experience with the devices, equipment and systems of the type and scope specified herein, and who has a fully staffed and equipped maintenance and repair facility, and who is licensed to perform work of this type in the project jurisdiction. Raceway installation shall be performed by a licensed C-10 contractor. All other work shall be performed by parties licensed to perform such work.
- B. Personnel: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section. Supervisors shall have at least five (8) years direct experience in similar work. Installation and maintenance personnel shall have at least three (5) years direct experience in similar work.
- C. Designated supervisor: Provide a designated supervisor present and in responsible charge in the fabrication shop and on the project site during all phases of installation and testing of the work of this section. This supervisor shall be the same individual through the execution of the work unless illness, loss of personnel, or other circumstances reasonably beyond the control of the contractor intervene.
- D. Coordination: Coordinate the work of this section with the work of all other sections. Comply with Division 01.
- E. Verification: Verify dimensions and conditions at the project site. Submit any conflicts in a timely manner for resolution.

- F. Project site installation and testing: Install as specified herein. Perform specified adjustment procedures. Provide test equipment and test according to procedures specified herein. Request verification of project site test in a timely manner.
- G. Verification of submitted test data: Re-test in presence of designated representatives of the Architect at reasonable mutual convenience. Provide services of the designated supervisor and an additional technician familiar with work of this section. Provide all test equipment. Provide complete set of latest stamped, actioned submittals of record for reference. Provide complete set of shop and project site test reports, as applies. Provide a complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- H. Reference/Project record documents: At all times when the work is in progress, maintain at the workplace, fabrication shop or project site as applies, a complete set of the latest stamped, actioned submittals of record for reference. Also maintain a separate, clean undamaged set for preparation of Project Record Documents. Also maintain at the workplace a complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- I. Schedule: Comply with the project schedule. Make all submittals specified herein in a timely manner. Failure to make timely submittals complete as specified herein is considered to be lack of substantial progress of the work of this section.
- J. Deliver all equipment, devices and material required for the work of this section and install, test and ready all work for acceptance testing at least 14 days prior to the completion date for the associated area of the project unless specifically instructed otherwise by the Architect

#### 1.04 DELIVERY, STORAGE, AND HANDLING

Comply with requirements of Division 01 and the following:

- A. Deliver materials in manufacturer's original undamaged packages or in bulk packing which provides equivalent protection.
- B. Store packaged materials off ground or slab in manner to protect them from elements, especially moisture damage.
- C. Deliver equipment to associated equipment rooms at the project site when major work of all other sections is complete, equipment room ventilation is operating with clean filters in place, the area is clean and free from airborne contaminants, and continuing work of other trades will not produce airborne contaminants or permit transport of such airborne contaminants to the equipment rooms.

#### 1.05 REGULATORY REQUIREMENTS

- A. Codes and regulations: Perform all work in strict accordance with all applicable Federal, State, County and City codes, regulations, and ordinances.
- B. Unlisted Equipment: Certain equipment specified herein does not bear listing by Underwriters Laboratories (UL). Such equipment is specified herein only where no equipment is known to exist bearing such listing which will perform the function required by the District. In such case, apply for field inspection of such equipment. Pay cost of such inspection.
- C. Accessibility Requirements
  - 1. Assistive-listening systems shall be provided in accordance with CBC Section 11B-219 and shall comply with CBC Section 11B-706.

2. The minimum number of receivers to be provided shall be equal to 4% of the total number of seats, but in no case less than two. 25% minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with CBC Section 11B-706.3.
3. If the system provided is limited to specific areas or seats, than such areas or seats shall be within a 50-foot viewing distance of, and have a complete view of, the stage or playing area. CBC Section 11B-219.4.

#### 1.06 APPLICABLE STANDARDS & AGENCIES

##### A. Conform to the following:

1. CEC California Electrical Code.
2. NFPA National Fire Protection Association.
3. CBC California Building Code.
4. UL Underwriters Laboratories.
5. FCC Part 15, Subpart B, Class A - Unintentional Radiators.
6. EIA/TIA Electronic Industries Alliance / Telecommunications Industry Association.
7. ANSI, ASTM, NEMA, and IEEE standards as applicable.
8. BICSI Telecommunications Distribution Methods Manual, current edition.

#### 1.07 OPERATING AND MAINTENANCE DATA

##### A. Manuals: In addition to the requirements of Division 01, submit two (2) additional sets. Submit in three (3) post binders (not ring binders) with tabs.

##### B. Include:

1. Index.
2. Systems operating instructions.
3. Maintenance and spare parts schedule.
4. Equipment manuals. Collate alphabetically by manufacturer. Provide manufacturer's original operation, instruction and service manuals for each equipment item. For each set, provide manufacturer's original printed copies only. Photocopies not acceptable.
5. Reduced set of system record drawings.
6. Key schedule.

##### C. As-Built drawings:

1. Quantity: One (1) digital set.
2. Format: CAD and PDF files on CD-ROM or DVD-ROM.
3. Content: All drawings required under "Shop Drawings". Show "as installed" condition. Where room designations according to project permanent signage differ from construction designations in the contract documents, show both designations.

##### D. Warranty certificates: Comply with Division 01.

#### 1.08 WARRANTY SERVICE

In addition to provisions of Division 01, provide the following:

- ##### A. Warranty: Warrant all of the work of this section to be free from defects in materials and workmanship for a period of twelve (12) months from the date of District acceptance.

- B. Response time: Provide a qualified technician familiar with the work at the project site within twenty-four (24) hours after receipt of a notice of malfunction. Provide the District with the telephone number attended eight (8) hours a day, five (5) days a week, to be called in the event of a malfunction.
- C. Off-site service: Conduct all warranty repairs and services at the project site, unless in violation of manufacturer's standard product warranty. Provide substitute systems, equipment, and/or devices acceptable to the District for the duration of off-site repairs. Provide transportation for substitute and/or test systems, equipment, devices, materials, parts and personnel to and from project site.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

#### A. Stationary Built-in Radio Frequency (RF) System

- 1. Listen Technologies Corporation <https://www.listentech.com>
- 2. Equal by Williams Sound, LLC <https://www.williamssound.com>

#### B. Stationary Built-in Infrared (IR) System

- 1. Listen Technologies Corporation <https://www.listentech.com>
- 2. Equal by Williams Sound, LLC <https://www.williamssound.com>

#### C. Portable Infrared (IR) System

- 1. Listen Technologies Corporation <https://www.listentech.com>
- 2. Equal by Williams Sound, LLC <https://www.williamssound.com>

### 2.02 STATIONARY BUILT-IN RADIO FREQUENCY (RF) SYSTEM – GYMNASIUM ASSEMBLY

#### A. Transmitter

- 1. Model: Listen Technologies LT-800-072-01 RF Transmitter (72 MHz).
- 2. Quantity: Provide (1) per System.
- 3. RF Channels: (57) broadcasting channels.
- 4. Input Channels: (2) independent mixing audio input channels.
- 5. Antenna: Listen LA-123 Antenna with LA-130 Remote Mount.
- 6. Mounting: Rack mounted, inside PA System rack.
- 7. Rack Unit Size: 1U.
- 8. Accessories: Listen LA-326 Rack Mount.
- 9. Furnished/Installed: Contractor Furnished / Contractor Installed.

#### B. Receiver

- 1. RF Receiver: Listen Technologies LR-5200-072 Intelligent DSP RF Receiver.
  - a. Quantity: As per Drawings, (2) minimum.
- 2. Ear Speaker: Listen Technologies LA-401.
  - b. Quantity: (1) per receiver.
- 3. Hearing Aid Loop: Listen Technologies LA-430.
  - c. Quantity: 25% of receivers, (2) minimum.

#### C. Accessories



1. Receiver Case: Provide storage case(s) for number of devices specified in drawings.
2. Charging Tray: Listen Technologies LA-381 (rack mounted).

## 2.03 STATIONARY BUILT-IN INFRARED (IR) SYSTEM – CLASSROOM

### A. Transmitter

1. Model: Listen Technologies LT-82-01 ListenIR Transmitter.
2. Quantity: Provide (1) per Classroom.
3. Carrier Frequencies: 2.3 MHz, 2.8 MHz, 3.3 MHz, 3.8 MHz.
4. Carrier Channels: (4) selectable, mono or stereo modes.
5. Input Channels: (2) independent mixing audio input channels.
6. Mounting: Rack mounted, inside AV Cabinet.
7. Rack Unit Size: 1U.
8. Accessories: Listen LA-326 Rack Mount.
9. Furnished/Installed: Contractor Furnished / Contractor Installed.

### B. Radiator

1. Model: Listen Technologies LA-140-WH Stationary IR Radiator.
2. Quantity: (1) per Transmitter.
3. Frequencies: 1 MHz – 5 MHz.
4. Coverage: 10,000 square feet.
5. Color: White.
6. Mounting: Ceiling mounted.
7. Furnished/Installed: Contractor Furnished / Contractor Installed.

### C. Receiver

1. IR Receiver: Listen Technologies LR-4200-IR Intelligent DSP IR Receiver.
  - a. Quantity: As per Drawings, (2) minimum.
2. Ear Speaker: Listen Technologies LA-401.
  - a. Quantity: (1) per receiver.
3. Hearing Aid Loop: Listen Technologies LA-430.
  - a. Quantity: 25% of receivers, (2) minimum.

### D. Microphone

1. Lavalier Wireless: Shure BLX14R/W85.
2. Quantity: (1) per system.
3. Mounting: Receiver rack mounted in AV Cabinet.

### E. Accessories

1. Receiver Case: Provide storage case(s) for number of devices specified in drawings.
2. Charging Tray: Listen Technologies LA-381 (rack mounted).

## 2.04 PORTABLE INFRARED (IR) SYSTEM – CONFERENCE ROOM

### A. Transmitter

1. Model: Listen Technologies LT-84-01 ListenIR Transmitter/Radiator Combo.

2. Quantity: 1 per system, number of systems as per Drawings.
3. Frequencies: (4) selectable frequencies: 2.3 MHz, 2.8 MHz, 3.3 MHz, and 3.8 MHz.
4. Coverage: 7,500 square feet.
5. Input Channels: (2) independent mixing audio input channels.
6. Mounting: Table top tripod.
7. Furnished/Installed: Contractor Furnished / Contractor Installed.

B. Receiver

1. IR Receiver: Listen Technologies LR-4200-IR Intelligent DSP IR Receiver.
  - a. Quantity: As per Drawings, (2) minimum.
2. Ear Speaker: Listen Technologies LA-401.
  - a. Quantity: (1) per receiver.
3. Hearing Aid Loop: Listen Technologies LA-430.
  - a. Quantity: 25% of receivers, (2) minimum.

C. Microphone

1. Tabletop: Listen Technologies LA-277 omnidirectional.
2. Quantity: (1) per system.

D. Accessories

1. Receiver Case: Provide storage case(s) for number of devices specified in drawings.
2. Table Top Tripod: Listen Technologies LA-338.
3. USB Charger: Listen Technologies LA-423.

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform the work of this section in accordance with acknowledged industry and professional standards and practices and the procedures specified herein.
- B. Furnish and install (herein, "provide") all materials, devices, components, and equipment required for complete, operational systems.

3.02 TEST EQUIPMENT

- A. Furnish, store and maintain test equipment for both routine and acceptance testing of the work of this section:
  1. Provide all items of equipment or materials required to demonstrate conformance with the contract documents.

3.03 FINISHES

- A. Finishes and materials for equipment mounting in furniture or casework, and in general any item or component herein which is visible shall adhere to the following:
  1. Finish shall be as directed by the Architect.

### 3.04 SYSTEMS PERFORMANCE TESTING AND ADJUSTING PROCEDURES

- A. Upon completion of the installation of all equipment in an area, perform the following tests and record results. Verify safe and proper operation of all components, devices, or equipment, establish nominal signal levels within the systems and verify the absence of extraneous or degrading signals. Make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable. Submit test report. Correct all non-conforming conditions prior to requesting acceptance review testing. Perform at least the following procedures:
1. Mechanical Verification:
    - a. Integrity of all support provisions.
    - b. Absence of debris of any kind, tools, etc.
  2. Power and Isolated Ground Verification:
    - a. Isolation of Isolated Ground System from raceway and related ground.
    - b. Grounding of devices and equipment. Integrity of signal and technical power system ground connections.
    - c. Proper provision of power to devices and equipment.
  3. Signal Wiring Verification:
    - a. Integrity of all insulation, shield terminations and connections.
    - b. Routing and dressing of wire and cable.
    - c. Continuity, including conformance with wire designations on running sheets, field and shop drawings.
    - d. Absence of ground faults.
    - e. Polarity.
  4. Use the proper sequence of energizing systems to minimize the risk of damage. Energize.

### 3.05 ACCEPTANCE REVIEW AND TESTING PROCEDURES

- A. Complete all work of this section. Submit test report. Submit review copies of Operating and Maintenance Manuals, less reduced set of Record Drawings. Notify the Architect in writing that the work of this section is complete and fully complies with the contract documents. Request acceptance review testing. The representative of the Architect will conduct verification of submitted test data, and otherwise direct testing and adjustment of this work. These procedures may be performed at any hour of the day or night as required by the representative of the Architect to comply with the project schedule and avoid conflict with these procedures from possible ongoing work of other sections. Provide all specified personnel and equipment at any time without claim for additional cost or time.
- B. Personnel: Provide services of the designated supervisor and additional technicians familiar with work of this section. Provide quantity of technicians as required to comply with the project schedule.
- C. In addition, provide:
1. Set of hand and power tools appropriate for performance of adjustment of and corrections to this work. Include spare wire and connectors and specified tooling for application.
  2. Ladders, scaffolding and/or lifts as required to access high devices.
  3. All test equipment.
  4. Complete set of latest stamped, actioned submittals of record for reference.
  5. Complete set of shop and project site test reports.

6. Complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
- D. Demonstrate complete operation of all systems and equipment including portable equipment.
- E. Adjust as directed by the representative of the Architect.
- F. Correct, in a timely manner, any work that fails to comply with the contract documents as reasonably determined by the representative of the Architect.

3.06 CLOSEOUT

- A. Punch List: Perform any and all remedial work, at no claim for additional cost or time. Where required, retest and submit test report. Notify Architect of completion of punch list.
- B. Portable Equipment: Furnish all portable equipment and spares to the designated representative of the District along with the complete documentation of the materials presented.
- C. Submit Operating and Maintenance Data manuals.
- D. Submit project record documents.
- E. Conduct specified training.
- F. Submit warranty, dated to run from date of District's acceptance of the work.

3.07 DISTRICT'S RIGHT TO USE EQUIPMENT

- A. Acceptance of the work of this section will be after completion of corrections and adjustments required by the Punch List which results from acceptance review and testing of the completed installation. The District reserves the right to use equipment, material, and services provided as part of the work of this section, prior to acceptance, without incurring any obligation to accept any equipment or completed systems until all punch list work is complete and all systems comply with the contract documents, or accept any claim for additional cost or time.

END OF SECTION 27 51 26

SECTION 27 53 13 – CLOCKS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with the Clocks, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Transmission System
    - a. Primary External Transmitter
  - 2. Wireless Synchronized Devices
    - a. Analog Clock
- C. Related Sections: Division 16 – Electrical 120 V 60Hz grounded outlet required for external transmitter.

1.02 REFERENCES AND DEFINITIONS

- A. References:
  - 1. This Technical Specification and Associated Construction Documents.
  - 2. National Fire Protection Agency (NFPA) – 70, National Electric Code 2002
  - 3. Visiplex Time Systems, Inc. TimeSync Pro Synchronized Wireless Time & Data System User Manual.
- B. Definitions:
  - 1. GPS: Global Positioning System, a worldwide system that employs 24 satellites in an integrated network to determine geographic location anywhere in the world, and which employs and transmits atomic time, the most accurate and reliable time.

1.03 SUBMITTALS

- A. Product Data: Submit complete catalog data for each component, describing physical characteristics and method of installation.
- B. Operating License: Submit evidence of application for operating license prior to installing equipment. Furnish the license, or if the license has not been received, a copy of the application for the license, to the Owner prior to operating the equipment. When license is received, deliver original license to Owner.
- C. Manufacturer's Instructions: Submit complete installation, set-up and maintenance instructions.

1.04 QUALITY ASSURANCE

- A. Permits: Obtain operating license for the transmitter from the FCC (provided by Visiplex).
- B. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing commercial wireless systems with a documented experience of minimum of 10 continuous years.
  - 2. Installer: Company with documented experience in installation of commercial wireless systems.
- C. Regulatory Requirements:
  - 1. Equipment and components furnished shall be of manufacturer's latest model.
  - 2. Encoder, Transmitter and receiver shall comply with Part 90 of FCC rules, as follows:
    - a. This device may not cause harmful interference, and
    - b. This device must accept interference received, including interference that may cause undesired operation.
    - c. Transmitter frequency shall be governed by FCC Part 90.35.
    - d. Transmitter output power shall be governed by FCC Parts 90 and 74.
  - 3. System shall be installed in compliance with local and state authorities having jurisdiction.

1.05 DELIVERY STORAGE AND HANDLING

- A. Deliver all components to the site in the manufacturer's original packaging. Packaging shall contain manufacturer's name and address, product identification number, and other related information.
- B. Store equipment in finished building, unopened containers, until ready for installation.

1.06 PROJECT SITE CONDITIONS

- A. Clocks, Data displays and PA speakers shall not be installed until painting and other finish work in each room is complete.
- B. Coordinate installation of GPS receiver and external antenna (if used) for access to the roof or exterior side-wall so that the bracket and related fasteners are watertight.

1.07 SYSTEM DESCRIPTION

- A. GPS synchronized wireless time system shall continually synchronize clocks, data display units and PA speakers time throughout the facility and wireless PA voice messaging where needed.
- B. The system shall synchronize all clocks to each other. The system shall utilize GPS technology to provide atomic time to all its components. The system shall not require any hard wiring (beside AC power) for all its components. Analog clocks could be battery operated for full portability if required. Clocks shall automatically adjust for Daylight Savings Time, and capable of multiple time zones readouts where needed.
- C. Analog Clocks shall be synchronized within 2 milliseconds up to 6 times per day, and each clock shall have an internal oscillator that maintains plus or minus one second per day between synchronizations, so that overall clock accuracy shall not exceed plus or minus 0.05 seconds.
- D. The system shall include an internal real time clock reference so that failure of the GPS signal shall not cause the clocks to fail in indicating the right time.

- E. The system shall incorporate a “fail-proof” design so that a temporary power interruption shall not cause failure of the all system. Upon restoration of power, the system shall resume normal operation without the need to reset the system or any of its components.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURER

- A. GPS synchronized wireless time, voice and data system and its components shall be manufactured by Visiplex Time Systems, Inc., Vernon Hills, IL 60015, (877) 918-8463 [www.timesyncpro.com](http://www.timesyncpro.com).

### 2.02 SYSTEM OPERATION AND STARTUP SEQUENCE

- A. The TimeSync Pro system receives Atomic time information every second from the GPS receiver that is mounted outdoors and is connected to system encoder. The encoder is a powerful multitasking device that is capable of sending accurate time information to synchronize all the system wireless clocks.
- B. Encoder Operation: When power is first applied to the Encoder, it checks for and displays the software version. The Encoder looks for the GPS time signal. Once the Encoder has received the GPS time, it sets its internal clock to that time. The Encoder then starts to transmit its internal time once every minute. The Encoder updates its internal clock every time it receives valid time data from the GPS receiver.
- C. Analog Clock Operation:
  - 1. Insert batteries (if installed, remove for 10 seconds and reinstall) into the clock. The clock will go through the hand synchronization process for a minute and will stop at 12:00. At that point push the Control button on the back of the clock.
  - 2. After few seconds, the clock receiver will look for valid time transmission. The monitoring LED at the back of the clock will flash during that period of time. After a valid time data is received the monitoring LED will stop flashing, and the clock will adjust to the right time. The clock will look for valid time signals up to six times each day, and will resynchronize to the correct time if needed.
  - 3. If the clock has not decoded a valid time signal for three days, or if the batteries need to be replace (for battery operated models), the Seconds arm movement will change to two seconds movement steps.
- D. General: A basic clock system shall include an encoder, a built-in or external transmitter, a roof or window mounted GPS receiver and analog or digital clocks. An expanded system can also include wireless alphanumeric displays, wireless PA speakers and all accessories and options as needed for a complete operation.
  - 1. Encoder: Model TS2800 shall incorporate a display and a keypad to provide the following features:
    - a. Time zone selection via the keypad and display for all time zones in the world. Includes all US time zones: Eastern, Central, Mountain, Pacific, Alaska and Hawaii.
    - b. Automatic Daylight Saving Time Adjustment, can be enabled or disabled from keypad.
    - c. GPS interface and real time GPS status display mode.
    - d. Password protected Administrator Menu to set the date, local time zone, clock addresses, wireless PA speakers (if used), and other system parameters as needed.

- e. Database programming and administration using its keypad and LCD display
  - f. Telephone interface for remote voice access and system control
  - g. PC RS-232 interface for text messaging and administration.
  - h. The encoder shall contain an internal clock such that failure of reception from the GPS will not disable the operation of the clocks.
2. GPS Receiver: GPS roof or window mounted, with 15' cable attached (additional Visiplex Time Systems extension cable available: 50' and 100'). The GPS Receiver shall be a complete GPS receiver with a built-in antenna in a waterproof case, 3-7/8 inches by 4-3/16 inches by 2 inches, designed for roof or outdoor mounting. Provide mounting bracket for attachment to roof structure.
  3. Transmitter: Visiplex Time Systems, Inc. model, may be internal two or four-watt, or external TS101 series, up to 400-watts. The transmitter parameters shall be:
    - a. Frequency Range: 401 – 470 MHz.
    - b. Transmitter output power: Internal 4 – 4Watt (built into the encoder) or External 10-400Watt in black metal case, 16-3/4 inches by 12 inches by 1-7/8 inches in size.
    - c. Transmission Range: Up to 50 miles radius (transmitter depended).
    - d. Radio technology: Narrowband FM, 12.5KHz bandwidth
    - e. Transmission format: POCSAG, digital one-way communication
    - f. Digital Data rate: 512BPS
    - g. Operating range: 0 degrees C. to 70 degrees
  4. Antenna: shall be Visiplex Time Systems, Inc., Model TS654 (outdoor). Antenna polarization shall be vertical.
  5. Power supply: Visiplex Time Systems, Inc. VP-PS (included with encoder)
    - a. Input: 120-volt AC 50/60 Hz, 0.4 amps.
    - b. Output: 12-volt DC, 3 amps.
  6. Surge Protector/Battery Backup: Visiplex Time Systems, Inc., Model VS56450.
    - a. Input: 120-volt AC 60 Hz +/- 1 Hz.
    - b. Output: 120-volt AC, 500VA, 450-watts
    - c. Surge Energy Rating: 365 joules
  7. Analog clocks: Visiplex Time Systems, Inc. analog clock, Model TS-CLK-1462 (black second hand). Additional colors and finishes are available from manufacturer. Analog clocks shall be wall mounted. Clocks shall have polycarbonate frame and polycarbonate or glass lens. Face shall be white. Hour, minute and second hands shall be black. Other clock features shall be:
    - a. Analog clocks with no user mechanical adjustments, and fully automatic adjustment in 5 minutes after a power loss.
    - b. Time shall be automatically updated from the transmitter once a day at 2 am or six times a day (user selectable).
    - c. Use two "C" batteries or AC power adapter.
    - d. The clock shall have an ultra sensitive UHF receiver (better than -110dBm) and integrated internal antenna.
    - e. The clock will keep operating using its internal clock in case of signal reception loss due to malfunction of the system encoder or transmitter.

## PART 3 – INSTALLATION

### 3.01 SITE EXAMINATION



- A. Verify that construction is complete in spaces to receive equipment and that rooms are clean and dry.
- B. Verify that 120-volt electrical outlet is located within 6 feet of location of transmitter and the outlet is operational and properly grounded.
- C. Verify that all 120-volt electrical outlets for the powered clocks, alphanumeric displays, and PA speakers is located at the exact installation point and the outlet is operational and properly grounded

3.02 SYSTEM INSTALLATION

- A. Refer to the manufacturer installation manuals as supplied with the system, to install each one of the system components.

3.03 INSPECTION

- A. Prior to final acceptance, inspect each system component to function properly and replace parts that are found defective.

3.04 CLEANING

- A. Prior to final acceptance, clean exposed surfaces of all system components, using cleaning methods recommended by the manufacturer. Remove temporary protective film and labels from clock and display faces.

3.05 DELIVERY

- A. Provide training to Owner's representative on system setting and operation as demonstrated in the manufacturer system user guide.

END OF SECTION 27 53 13



Section 28 13 00

Access Control

Part 1 General

1.1 Section Includes

- A. Provide a scalable, open architecture access control system for security management, including engineering, supply, installation, and activation.

1.2 Related Sections

- A. Section 260500 – Common Work Results for Electrical, for interface and coordination with building electrical systems and distribution.
- B. Section 280513 – Conductors and Cables for Electronic Safety and Security, for cabling between system servers, panels, and remote devices.
- C. Section 280528 – Pathways for Electronic Safety and Security, for conduit and raceway requirements.
- D. Section 281600 – Intrusion Detection, for interface to building intrusion detection system.
- E. Section 282300 – Video Surveillance, for interface to video surveillance system.

1.3 References

- A. Reference Standards: Systems specified in this section must meet or exceed the following requirements:
  - 1. Federal Communications Commission (FCC)
    - a. FCC Part 15 – Radio Frequency Device
    - b. FCC Part 68 – Connection of Terminal Equipment to the Telephone Network
  - 2. Underwriters Laboratories (UL):
    - a. UL294 – Access Control Systems Units
  - 3. Electronic Industries Alliance (EIA):

- a. RS232C – Interface between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange
  - b. RS485 – Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multi-Point Systems
4. Federal Information Processing Standards (FIPS):
- a. Advanced Encryption Standard (AES) (FIPS 197)
  - b. FIPS 201-2: Open Options DNA Fusion FIPS in conjunction with an E2-SSP-D2-FIPS, NSC-100-FIPS, RSC-2-FIPS and other listed components will provide an access control solution that is fully FIPS 201-2 compliant.
  - c. Personal Identity Verification (PIV) of Federal Employees and Contractors
5. Homeland Security Presidential Directive 12 (HSPD-12)

#### 1.4 Access Control and Security Management System Description

- A. The Access Control and Security Management System (ACSMS) shall function as an electronic physical access and situational control system and shall integrate the alarm monitoring, Video Management System (VMS), ID badging, and database management into a single executable application. The ACSMS shall function as the primary means of controlling all access and situational control needs. A scalable, open architecture and network ready solution shall allow for an assured access and alarm monitoring solution.

#### 1.5 Submittals

- A. Manufacturer's Product Data: Submit the manufacturer's data sheets indicating systems and components proposed for use.
- B. Shop Drawings: Submit complete shop drawings indicating system components, wiring diagrams and load calculations.
- C. Record Drawings: During construction maintain record drawings indicating location of equipment and wiring. Submit an electronic version of record drawings for the Security Management System not later than Substantial Completion of the project.
- D. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, customized to the Security Management System installed. Include system and operator manuals.

- E. Maintenance Service Agreement: Submit a sample copy of the manufacturer's maintenance service agreement, including cost and services for a two year period for Owner's review.

## 1.6 Quality Assurance

### A. Manufacturers

1. A minimum of ten years' experience in manufacturing and design of access control systems using the Authentic Mercury Security hardware platform.
2. Recognized as a Mercury Security Platinum Elite Partner

### B. Suppliers

1. Authorized by Open Options as resellers.

### C. Fabricators

### D. Installers

1. Minimum of 1 technician that has successfully completed Open Options' certification training course will be present at the project site to supervise installation and test system during commissioning.

## 1.7 Delivery, Storage, and Handling

- A. Deliver materials in original packaging. Store and handle in accordance with the manufacturer's requirements.

## 1.8 Warranty

- A. Provide Manufacturer's warranty covering [1] year from date of shipment for replacement or repair of defective equipment.

## 1.9 Definitions

- A. Access Card: A coded employee card, usually the size of a credit card, recognizable to the access control system and read by a reader to allow access. It can be used for photo identification of the cardholder and for other data collection purposes. Card technologies include magnetic strips, wiegand-effect, proximity (active/passive), barium ferrite, smart/intelligent cards, and NFC enable applications on mobile devices.

- B. Access Control System: An interconnected set of controllers, managing the entrance and exit of people through secure areas.

- C. Access Level: The door or combination of doors and/or barriers an individual is authorized to pass through.
- D. Anti-Pass back (Anti-Tailgating): This feature protects against more than one person using the same card or number. It defines each system card reader and card ID number as IN, OUT or other. Once a card is granted access to an IN reader, it must be presented to an OUT reader before another IN reader access is granted. Cards will continue to have access to all authorized OTHER readers.
- E. Alarm: A signal that indicates a problem.
- F. Alarm input: A device that is monitored by the access control panel. An alarm signal will be generated if the device is activated.
- G. Badge: Badge is a template or a design for creating a card. WIN-PAK includes a full-featured badge layout utility for designing, creating, and printing badges. Badge design includes magnetic stripe encoding, bar coding, signatures, and so on.
- H. Bar Code: A method of encoding information using lines and blank spaces of varying size and thickness to represent alphanumeric characters.
- I. Biometrics: A general term for the verification of individuals using unique biological characteristics (i.e. fingerprints, hand geometry, voice analysis, the retinal pattern in the eye).
- J. Card and Card Holder: A card is an identity proof of a person and a card holder is a person who holds the card. Multiple cards can be assigned to a single card holder to provide different access.
- K. Controller: A microprocessor based circuit board that manages access to a secure area. The controller receives information that it uses to determine through which doors and at what times cardholders are granted access to secure areas. Based on that information, the controller can lock/unlock doors, sound alarms, and communicate status to a host computer.
- L. Card Reader: A device that retrieves information stored on an access card and transmits that information to a controller.
- M. Digital Video Recorder (DVR): A security system device that records the video from the surveillance cameras (IP and Analog) on a hard disk.
- N. Door: A generic term for a securable entry way. In many access control applications a "door" may actually be a gate, turnstile, elevator door, or similar device.

- O. Duress: Forcing a person to provide access to a secure area against that person's wishes.
- P. Input: An electronic sensor on a controller that detects a change of state in a device outside the controller.
- Q. Keypad: An alphanumeric grid which allows a user to enter an identification code. A flat device which has buttons that may be pressed in a sequence to send data to a controller, and which differs from a typewriter-like computer board.
- R. Output Relay: A device that changes its state upon receiving a signal from a controller. Typically the state change prompts an action outside of the controller such as activating or inactivating a device. The auxiliary relays found in access control panels or NODES that control external devices.
- S. Shunt Time: The length of time a door open alarm is suppressed (shunted) after a valid card access or free egress request. This time should be just enough to allow a card user to open a door or gate, pass through, and then close it.
- T. Time Schedules: Schedules that allow cards to function or not function depending on the time of day. This is used to limit access to the facility. The schedule may include not only time but which days of the week a card is valid.
- U. Video Management System (VMS): An enterprise-class video management and storage solution.

## Part 2 Products

### 2.1 Manufacturer

- A. DNA Fusion Access Control and Security Management System (ACSMS) by Open Options, L.P. 16650 Westgrove, Suite 150, Addison, TX 75001

### 2.2 Access Control and Security Management System Components

The ACSMS shall consist of three components: Database Server, Application Server, and User Interface. These components shall run on a single computer, virtual or physical, or on multiple computers allowing scalability in the configured architecture.

1. Database Server
2. Application Server

### 3. User Interface

In addition to the above three components, the ACSMS offers the following components that can be added to the system in order to provide enhanced functionality.

1. Open DX – Personnel data exchange tool used for provisioning personnel/cardholder information and access level assignment within the DNA Fusion ACSMS there by creating a logical link to the authoritative data source. The authoritative data source shall be one or more ActiveX Data Objects (ADO) compliant connections. Some examples of ADO compliant connections are Microsoft Active Directory, PeopleSoft, SQL Server database, CSV file, etc.
2. Flex API – A robust Application Programmer’s Interface to be used for the integration of 3<sup>rd</sup> party systems in order to expand the overall ACSMS. These system can include, but are not limited to, visitor management systems, video managements systems, identity management systems, intrusion detection systems, and physical security integration modules (PSIM).

#### 2.3 Access Control and Security Management System Operational Requirements

- A. The ACSMS shall be a highly scalable, robust access control and security management system developed using the latest in development technology. The ACSMS shall provide a singular interface capable of controlling multiple, geographically independent sites and provide alarm monitoring, video management integration, ID badging, personnel and cardholder management, and situational control of all connected devices from a single application.
- B. The ACSMS must fully support the Authentic Mercury Security Corporation controllers and sub-controllers.
- C. The ACSMS must support credential readers that communicate via wiegand, RS-485, or clock and data communications formats.
- D. The ACSMS must support the Open Supervised Device Protocol (OSDP).
- E. A sufficient number of controllers and sub-controllers will be provided to monitor all credential reader, monitor point, and relay point locations shown on plan.

#### 1. Capacities

- a. Maximum intelligent controllers per application server: 256
  - i. Intelligent controllers can be geographically independent

- ii. Must support IP and/or RS-485 communication methods.
- b. Maximum sub-controllers per controller: 32
  - i. This number varies per model of controller.
  - ii. Some controller models may have a smaller number for maximum sub-controllers.
- c. Maximum doors per controller: 64
  - i. This number varies per model of controller.
  - ii. Some controller models may have a smaller number for maximum doors
- d. Maximum pin digits: 15
- e. Maximum card formats: Unlimited
- f. Maximum Time Schedules per intelligent controller: 255
- g. Maximum holidays per intelligent controller: 255
- h. Maximum number of personnel records: Unlimited
- i. Maximum number of operators: Unlimited
- j. Maximum number of client connections: Unlimited

F. The ACSMS shall be capable of the following features:

1. Multi-User/Network Capabilities: The ACSMS shall support multiple operator workstations via local area network/wide area network (LAN/WAN). The communications between the workstations and the server computer shall utilize the TCP/IP standard over industry standard IEEE 802.3 (Ethernet). The communications between the server and workstations shall be supervised, and shall provide the ability to generate alarm messages when the server is unable to communicate with a workstation.
2. Operating Environment: The ACSMS shall be a 3-tier client/server, ODBC compliant application based on Microsoft tools and standards. The ACSMS application shall operate in the following environments: Microsoft Windows® Server 2008 R2 SP1, Microsoft Windows® 7 Professional SP1 (64-bit), Windows Server 2012 R2, Windows 8.1 Enterprise/Professional, and Windows 10 Enterprise/Professional.



3. Multi-level Password Protection: The ACSMS application shall provide multi-level password protection, with user-defined operator name/password combinations. Name/password log-on shall restrict operators to selected areas of the program. The application shall allow the assignment of operator levels to define the system components that each operator has access to view, operate, change, or delete.
4. Strong Password Enforcement: The ACSMS application shall have an option to enforce strong passwords and by setting minimum character lengths and complexity requirements.
5. Graphical User Interface: The ACSMS shall be fully compliant with Microsoft Graphical User Interface (GUI) standards, with the look and feel of the software being that of a standard Windows application, including hardware tree-based system configuration.
6. Concurrent Licensing: The ACSMS shall support concurrent client workstation licensing. The ACSMS application shall be installed on any number of client workstations, and shall provide the ability for any of the client workstations to connect to the application server as long as the maximum number of concurrent connections purchased has not been exceeded.
7. Access Control Software Suite: The ACSMS shall be a scalable application such that there is no requirement for separate tiers or editions of software. The same code set used for smaller, more localized installations, shall be the same code set used for enterprise system deployments.
8. Relational Database Management System: The ACSMS shall support industry standard relational database management systems (RDMS). This shall include the following: Microsoft SQL Server 2012 Express/Enterprise Edition, Microsoft SQL Server 2008 R2 Express/Enterprise Edition, and Microsoft SQL Server 2014 Express/Enterprise Edition.
9. System Partitioning/Filtering: The ACSMS shall provide the option to restrict access to data based on login and profile.
10. Encryption: The ACSMS shall provide multiple levels of data encryption.
  - a. True 128-bit AES data encryption between the host and intelligent controllers. The encryption shall ensure data integrity that is compliant with the requirements of FIPS-197 and SCIF environments. Master keys shall be downloaded to the intelligent controller, which shall then be authenticated through the Access Control and Security Management System based on a successful match.

- b. Transparent database encryption, including log files and backups.
  - c. SQL secure connections via SSL.
11. Industry Standard Panel Communication: The ACSMS shall communicate with the access control intelligent controllers via LAN/WAN connections utilizing industry standard communication protocols.
  12. Supervised Alarm Points: The ACSMS shall provide both supervised and non-supervised alarm point monitoring with the ability to specify custom values of resistance. On recognition of an alarm, the ACSMS shall be capable of switching and displaying the video from the camera connected to the video management system that is associated with the alarm point.
  13. Multiple Account Support: The ACSMS shall allow support for multiple accounts allowing separate access to the personnel database, badge layout, operator access, and reporting. Physical hardware may be filtered by profile level into “sites”. “Sites” may be assigned to one or more operator profiles. The system shall allow control of common areas between operator profiles. Access levels and time schedules shall be global to allow for easy administration and filtering. The global access levels and time schedules shall be capable of being used by one or more operator profiles.
  14. Video Management System Support: The ACSMS shall integrate with the major brands of video management systems (VMS).
  15. Camera Support: The ACSMS shall support, via integrated VMS platforms, pan, tilt, zoom, and touring features.
  16. Display Live Video: The ACSMS shall support an option to view live video from a camera connected to an integrated VMS. The cameras from the integrated VMS shall be able to be associated with any hardware device programmed in the ACSMS and opened automatically on any system event or operator initiated command sequence.
  17. Global/Anti-Passback: The ACSMS shall support multiple modes of anti-passback, by which cardholders must follow a specified sequence of card reads in the configured areas.
  18. Alarm Events: The ACSMS shall include a feature where alarm events with defined priorities shall be able to pop-up automatically in an Alarm event window for operator attention. The pop-up shall display the following information: description of the event, time, date, point description, if a card event the card number, type of

event and cardholder name. An event counter shall also display the number of times the event was reported to the Alarm event monitor prior to Acknowledgement or Clearing the event. Event instructions shall be made available by double clicking on the event. The Alarm shall also display an icon to indicate that a camera is associated to the device. The Alarm event window shall allow the operator to initiate a physical response to the event as well as a written response. Responses shall include but not be limited to: acknowledge, clear, open a pre-programmed floor plan, activate, deactivate, pulse, time pulse, add comment, retrieve archived video, and bring up live video, disarm, or arm.

19. Global Device Control: The ACSMS shall allow manual control of one or more selected inputs, outputs, and doors. Global device control shall include pulse, timed pulse, and energize/de-energize or return to normal options for output points and arm/disarm or return to normal options for input points. For global control of doors the ACSMS shall include Disabled, Unlocked, Locked, Facility Code Only, Card Only, PIN Only, Card and PIN, Override Mode, and Cancel Override Mode.
20. Global Edit: The ACSMS shall support, by way of a multi-select function, a method to globally edit input points, output points, doors, readers, personnel and cards.
21. Levels of System Operation: The ACSMS shall include a feature to define the levels of system operation for each individual operator using passwords and profiles. System operation for individual operators shall include, but not be limited to, restricted time periods for login, inactivity notifications, and lockout for failed logon attempts. Operator actions range from no view or control rights to basic monitoring including the ability to block the viewing of card and or personal identification numbers, to full control of the system including programming.
22. Distributed Processing: All the control components of the ACSMS shall utilize “Distributed-Processing” design. The distributed processing shall include the ability to download operating parameters to any field panel, thus allowing the field panel to provide full operating functions independent of the ACSMS application server.

G. The ACSMS shall have the major functional capabilities (considered essential for the system described in this specification) categorized as follows:

1. General Application Requirements

- a. All transactions and audits shall be logged by date and time to the database.
- b. The end-user shall have the ability to make any system configuration changes such as, but not limited to door open time, door contact shunt

time, point and door names, when and where a cardholder is authorized, and the ability to add or modify personnel records at any time and without assistance from the manufacturer or system installer.

- c. Shall support Global Anti-pass back, feature allowing cardholders to enter/exit any such defined card reader area on any intelligent control panel provided they follow the required in/out flow.
- d. Anti-pass back modes shall include: hard (no forgiveness), soft (allows access but generates an alarm event) and timed for all readers on the intelligent controller, on specified reader or card for a definable period of time up to 1092 minutes.
- e. Shall support a Duress PIN feature that is configurable in operation by which the cardholder either adds a specified digit to their unique PIN or appends a specified digit to their unique PIN.
- f. Shall support Two Card Control on any door, by which two different credentials with the proper access must be presented at the same door within a 5 second window of time.
- g. Shall support a Photo Recall option with four separate, configurable windows that displays the photo(s) associated with the personnel records as the credentials are used. The Photo Recall windows shall be configurable to show the credential reads from all doors, or only specific doors. In addition, the Photo Recall window shall be configurable as to what system data will be displayed for each transaction.
- h. Shall support the scheduling of any system or custom system reports.
- i. Shall support Auto-Email function, by which any event or point in the system can be configured to send an email using replacement parameters. The replacement parameters shall be used to query data from the database for insertion into the body, subject line, or address field of the email.
- j. All updates and changes to the programming in the intelligent controllers shall take place real-time and will not require manual downloads to propagate system changes.
- k. Shall have an available Application Program Interface (API) built on current development technologies that allows the integration of third party programs or systems.

- l. Shall be an intuitive Graphical User Interface (GUI) that implements a multi-document layout. An operator will not be required to close or switch views to another part of the application in order to edit or view any aspect of the system. The GUI must be fully customizable allowing for an infinite number of operator views to be created and assigned. The GUI must support drag and drop functions within the multi-document interface.
- m. Shall support global I/O functions, by which any point in programmed in the system can be configured to control any other point on the system regardless of which intelligent controllers they reside on.
- n. All necessary system drivers shall run as Windows services and as such do not require the Operating System to be logged in on the application server.
- o. Shall have support for thick client, web client and mobile client applications that provide system management functions.
- p. Shall support a Situation Level Manager that provides five different states that can be initiated by clicking on a single, color coded button. The Situation Levels shall be configurable on the following objects: Doors, Time Schedules, Input Points, Output/Relay Points, and Credentials.
- q. Shall provide intuitive Info-Ready™ reporting by which an operator must only right click on an object to run a Trace History Report, Has Access To, Who Has Access, Who Does Not Have Access, Last Used, and Non-Use.
- r. The GUI shall be developed in such a manner that any place that a personnel record or hardware device is shown that an operator can right click on it and open the properties or execute control functions.
- s. Shall support a method of controlling any device connected to the system in order to effectively change the state of a single point or group of points where supported by the hardware.
- t. Shall support Direct Commands, which allow the creation of a single button to control a single or all devices simultaneously by clicking one button, based on operator privileges.
- u. The Direct Commands shall be one of many ways to incorporate facility lockdowns and return to normal or all clear states.

- v. Shall support the ability to password protect the Direct Commands to require additional authentication when executing them.
- w. Must support the ability to remove an input point from service, where by any change of state on that point is ignored, regardless of the point arm/disarm state. Removing a point from service goes beyond disarming the point, as it can be rearmed via a programmed or manual event, thereby reporting alarm conditions once again. A point that has been removed from service must be returned to service in order to see change of state events on it.
- x. Must support Override Modes on doors, whereby the current mode of the door can be overridden to another state. I.E. Card Only, Card & PIN, Locked, Disabled. When the mode of door has been overridden, it will remain in that state, regardless of any scheduled commands or manual control initiated based on time or operator execution. When the override mode is canceled, the door will revert to the state that it is supposed to be in. I.E. if a time schedule has activated to unlock the door, then it will revert to that state without any additional programming or intervention from the operator.
- y. Removal from service and override modes must be selectable with the following options:
  - 1. Indefinite – Meaning the state will remain until it has been canceled
  - 2. For a specified number of minutes.
  - 3. Until a specific time of the current day.

## 2. Personnel and Cardholder Management

- a. Shall provide a personnel browser method of managing personnel data in a hierarchical tree. The personnel browser shall be sortable by in field of data stored in the personnel record.
- b. Shall have the ability to create custom personnel groups that personnel records can be assigned to where by personnel records can be assigned to one or more personnel groups.
- c. Shall have the ability to assign default access levels to custom personnel groups that cardholders will inherit or disinherit as they are added or removed to or from custom personnel groups.

- d. Shall have the ability to assign one or more credentials to a single personnel record.
- e. Shall support a maximum of 128 access levels per credential per intelligent controller.
- f. Shall support Precision Access Levels, by which an operator need not create an access level to assign access to a single door, but only click and drag said door into the access level assignment window of the credential and associate a time schedule with it.
- g. Shall support a Vacation Start function on credentials to allow the temporary disabling of cards for a specified number of days.
- h. Shall support a Temporary Upgrade of Access Levels by which an operator can temporarily assign an access level with start and stop dates.
- i. Shall support an activation and deactivation date and time of a credential down to the minute within a day.
- j. Shall support the capture of personnel photos and signatures to be used for ID badge printing.
- k. Shall support the ability for any personnel or credential field to be retrieved and printed on an ID badge.
- l. Shall support the ability for any or all credentials activate or deactivate based on a system controlled Situation Level.
- m. Shall support Info-Ready™™ reports on personnel groups providing the following information: Last Used and Non-Use.
- n. Shall support the ability to assign/re-assign credentials to personnel records by way of a drag and drop convention.

### 3. Time Schedules and Holidays

- a. Shall support up to 255 individual time schedules per time schedule set.
- b. Shall support up to 255 individual time schedule sets that are then assignable to intelligent controllers.

- c. Shall support up to 12 different start and stop intervals for each day, including holidays.
- d. Shall support time schedule templates to quickly build common time schedules.
- e. Shall support a copy feature to copy time schedules between time schedule sets.
- f. Time schedules shall be assignable to any or all access levels or precision access levels.
- g. Shall support the ability to manually control any or all time schedules programmed in the system by providing the following commands: Temporary Off, Temporary On, Override Off, Override On, and Resume Normal State.
- h. Shall support the ability for any or all time schedules to be manually controlled by the changing of the Situation Level Manager.
- i. Shall support up to 255 holiday sets that are then assignable to intelligent controllers.
- j. Shall support creating a holiday to span up to 365 days.
- k. Shall support up to eight different holiday types.

#### 4. Access Levels

- a. Shall support an unlimited number of access levels.
- b. Access levels shall be capable of being global or intelligent controller based.
- c. Shall support the option to assign activation and deactivation dates/times to access levels.
- d. Shall support three types of escort requirements for access levels: Not an Escort, Is an Escort, and Requires an Escort.
- e. Shall support a default time schedule to be assigned to the access level or separate time schedules to individual doors within the access level.



- f. Shall support eight different access level categories that can then be assigned to operator profiles granting rights to assign the category of access level or not.
- g. Shall support an Info-Ready™™ report named Assigned To that provides a list of all credentials the access level is assigned to with the ability to remove the access level from cardholders directly from the result set window.
- h. Shall support a click and drag method of assigning access levels to a single credential, personnel record, or group of personnel records.

## 5. Hardware

- a. Shall support a browser based, hierarchical tree structure that displays the programmed hardware with current states and provides command and control capabilities based on operator privileges.
- b. The tree structure shall be developed in such a way that it is intuitive for the operator to navigate.
- c. The tree structure shall provide, based on operator privileges, the ability to group edit and control similar devices.
- d. The tree structure shall have an option to display a tooltip upon hovering over a specific device to obtain detailed status information.

## 6. Integrated ID Badging

- a. Shall have an integrated photo capture and ID badging module.
- b. The integrated ID badging module shall support an unlimited number of badge templates.
- c. The badging station shall include a badge designer to create badge templates.
- d. The badge designer shall allow any data field associated with a personnel record to be printed or otherwise used on the credential.
- e. The integrated ID badging module shall support a dedicated, high end photo badging camera from Valcam (Model# 9000-628).

- f. The integrated ID badging module shall support, through the use of a third party TWAIN Driver, the ability to use any TWAIN compliant USB camera.
- g. The badge designer shall provide scripting capabilities to create a robust and streamlined template process by which the layout of a single template can be edited based on data retrieved from the personnel record.
- h. The integrated ID badging module shall support a cropping mechanism in order to resize photos and select the printable area of the picture.
- i. The integrated ID badging module shall support any credential printer that has a Windows print driver
- j. The integrated ID badging module shall offer, depending upon the printer selected, the ability to create a template that will read the encoded card number from the credential as it passes through the printer during the printing process and then associate it with the personnel record automatically, thereby removing the need for the operator to manually enter the credential number. This feature will require a reader/encoder be installed inside the printer prior to setup.
- k. The integrated ID badging module shall provide a print preview function that allows the operator to verify the credential format prior to actually printing it.
- l. The integrated ID badging module shall support the capturing of signatures during the credentialing process.

## 7. Integrated Graphics Maps

- a. Shall provide, with no additional licensing fees required, an integrated and robust graphical map module allowing for the importation of floor plans and other .JPG or .BMP files for use in plotting hardware and other connected devices programmed in the system onto the graphic layouts.
- b. Shall support the ability to assign a graphic map as a homepage of any point in the system, thereby linking that device to that map and allowing the system to automatically load the graphic upon an alarm condition from any point that is plotted on it.
- c. Shall support any command and control or reporting functions available in the Hardware Browser for any point that is plotted on a graphic map.

- d. Shall support the hyperlinking of graphic maps to one another, thereby creating a “drill down” effect.
- e. Shall support the ability to plot any camera that is integrated to the core application onto a graphics map and display the live video in a tooltip window upon the operator hovering over the icon, or displaying of live video in a video container window upon left clicking the camera icon.
- f. Shall support the real-time status updating of points that are plotted on a graphics map by configurable colors, shapes, or icons.
- g. Shall support the ability to plot the same device on a single graphic map multiple times to get varying states of status reported simultaneously.
- h. Shall support the ability to create buttons on the graphic maps which can then be linked to Direct Commands.

## 8. Mobile Applications

- a. Must have auxiliary mobile application supported on Android and iOS devices
- b. Mobile applications will be native applications and not remote/mobile browser solutions.
- c. Mobile applications will be available for download from the respective application markets, and will not require side loading of any kind.
- d. Mobile applications will utilize profiles established in the DNA Fusion system to control what the operator has the ability to do via the mobile application.
- e. Mobile application will support the following features:
  - i. Secure login using SSL
  - ii. Alarm viewing/acknowledgement
  - iii. Door status and control
  - iv. Personnel control, to include adding access levels and taking photos using the devices camera
  - v. Direct Command execution allowing for site or system lockdowns.
  - vi. Trace History reporting
  - vii. Live camera viewing from supported/integrated Video Management Systems.

## 9. Integrated Video Management Systems

- a. Shall support the integration of Digital Video Recorders (DVR) and Network Video Recorders (NVR) from the following manufacturers:
  - i. Milestone
    - 1. Corporate
    - 2. Enterprise
    - 3. Professional
  - ii. ONSSI
    - 1. Ocularis
  - iii. ExacQ Vision
  - iv. Aimetis
  - v. Pelco DS
  - vi. Video Insight
  - vii. Bosch
  - viii. Salient Systems
  - ix. Panasonic
  - x. 3XLogic
  - xi. Avigilon
  - xii. March Networks
  - xiii. Act-I
- b. Shall support the ability to associate cameras from DVR/NVR to devices in DNA Fusion.
- c. Shall support, at minimum, the ability to launch live and recorded video based on a right click command in the DNA Fusion software, or automatically based on a pre-programmed event based action.
- d. Shall support the ability to initiate presets or PTZ controls

## 10. Integrated Biometrics

- a. Shall support an integration with the following biometric solutions
  - i. Morpho
    - 1. Morpho 3D Face Reader
    - 2. MorphoAccess SIGMA Series
    - 3. Outdoor MorphoAccess 500 Series
    - 4. MorphoAccess J Series
    - 5. MorphoAccess 500+ Series
    - 6. MorphoAccess VP Series

## 7. MorphoSmart 300 Series (Enrollment Only)

- ii. Suprema
  - 1. BioEntry Plus
  - 2. BioEntry W
  - 3. BioLite Net
  - 4. BioStation
  - 5. BioStation T2
  - 6. FaceStation

- iii. Allegion
  - 1. HK
  - 2. HKII

- b. The integration shall be direct, by which the biometric templates are captured via DNA Fusion and will not require manual entry via 3<sup>rd</sup> party application.

## 11. Integrated Wireless/Intelligent Locks

- a. Shall support the following wireless/intelligent lock sets from Allegion/Schlage:
  - i. AD300/400
  - ii. AD301/401
    - 1. Must support Wake On Radio (WOR) function for AD400/401 locks to remotely control the lock states via wireless communication.
    - 2. Must support the following modes on the Allegion/Schlage locksets:
      - a. Classroom
      - b. Privacy
      - c. Office
      - d. Apartment
      - e. Toggle Credentials
      - f. Deadbolt

3. Must support the ability to initiate linking mode, to link the AD400 lockset to the PIM device, via the ACSMS software, without using the Handheld Device (HHD).
  4. Must support Over the Network Re-Provisioning (ONR) of the firmware to the PIM, AD300, AD400, AD301 and AD401.
- iii. Engage NDE
1. Engage Gateway – RS485 device communicating to DController, SSP-DP or SSP-LX to provide support for up to 10 NDE locks using Bluetooth Low Energy (BLE).
  2. Must support a wake on radio function to control the connected NDE locks
  3. Must support the ability to initiate linking mode in order to link the NDE lock to the NDE Gateway
  - 4.

## 12. Integrated Intrusion Detection Systems

- a. Shall support an integration with the following Intrusion Detection Systems (IDS) by providing real-time event reporting and control capabilities.
  - i. Bosch
    1. 7412GV2
    2. 9412GV2
  - ii. DMP
    1. XR500N
- b. Shall show in the Hardware Browser real-time states of the areas and zones from the IDS panels.
- c. Shall support right click functionality for controlling the arm/disarm states of the areas/zones.

- d. Shall allow for the areas/zones from the IDS panels to be plotted on graphic maps in DNA Fusion.
- e. The following IDS receivers shall be supported by the ACSMS to provide monitoring only capabilities of connected IDS panels.
  - i. Bosch D6600
  - ii. DMP SCS1R

### 13. Integrated Visitor Management Systems

- a. Shall provide a mechanism, Flex API, which allows for the integration of the following 3<sup>rd</sup> party Visitor Management Systems.
  - i. HID EasyLobby
  - ii. iVisitor
- b. The integrated Visitor Management Systems shall be certified as an approved integrated solution by Open Options.

### 14. Integrated Intercom Systems

- a. Shall provide a means to integrate intercom master and sub-stations into the application
- b. The master and sub-stations shall be displayed in the Hardware tree in a hierarchical manner (i.e. Master station with associated sub-stations)
- c. The status of the connected devices shall be represented in the Hardware tree notated by the following colors:
  - i. Green – Station is online and idle (i.e. ready for a call)
  - ii. Blue – Station is busy
  - iii. Red – Station is currently connected to another station (in a call)
  - iv. Black – Offline or non-existent
- d. Shall provide a means in which to control the connected devices by a right-click menu option to execute the following functions:
  - i. Make Call – Initiates a call to the selected station
  - ii. Cancel Call – Terminates the current call in progress
  - iii. Answer Call – Opens communications for the incoming call

- e. Shall provide the ability to plot the intercom devices on a graphics map.
  - i. Intercom devices on the map shall provide the ability to indicate status
  - ii. Intercom devices on the map shall provide the ability to control the connected devices
- f. Shall provide the ability for automatic camera call up on intercom device status changes (i.e. Incoming call from sub-station calls up a live camera view)
- g. Shall provide a means of triggering system or hardware control actions based on status changes of the connected intercom hardware
- h. Supported Intercom Solutions
  - i. Zenitel – Stentofon AlphaCom with supported master and sub-stations

## 2.4 ACSMS Computer Requirements

### 1. DNA Fusion Application Server Requirements

- a. DNA Fusion Application Server controlling 50 doors or less and 10 clients or less
  - i. Processor (Intel Core i7 or equivalent) or greater
  - ii. 4 GB RAM or greater
  - iii. 500GB HDD or greater
  - iv. 10/100 NIC or greater
  - v. Windows 7 Enterprise, Windows 8/8.1 Enterprise, Windows 10 Enterprise, Windows Server 2008 R2, Windows Server 2012  
(\*Operating systems must be Professional/Enterprise versions and not Home/Personal editions.)
- b. DNA Fusion Application Server controlling 50 doors or more and 10 clients or more
  - i. Processor (Intel Core i7 or equivalent) or greater
  - ii. 8 GB RAM or greater
  - iii. 500GB HDD or greater



- iv. 10/100 NIC or greater
  - v. Windows Server 2008 R2, Windows Server 2012
- c. Open Options fully supports virtualized environments provided the specifications meet the minimums listed above.

## 2. DNA Fusion Client Workstation Requirements

### a. DNA Fusion Standard and Photo ID Workstations

- i. Processor (Intel Core i7 or equivalent) or greater
- ii. 4 GB RAM or greater
- iii. 500GB HDD or greater
- iv. 10/100 NIC or greater
- v. Windows 7 Enterprise, Windows 8/8.1 Enterprise, Windows 10 Enterprise (\*Operating systems must be Professional/Enterprise versions and not Home/Personal editions.)

## 2.5 Access Control Hardware Requirements

1. The access control hardware will be a distributed intelligence, open architecture platform capable of scalability.
2. The access control hardware shall be offered in two form factors: as board only product or as enclosed product.
3. The enclosed product shall be offered as a factory, pre-wired unit and must be a UL recognized assembly.
4. The enclosed products must be offered as a 1U rack mountable intelligent controller or as a plenum rated poly carbonate enclosure.
5. The access control hardware will be in use and deployed by a minimum of 10 access control manufacturers.
6. The access control hardware shall work in a hierarchical structure, by which an intelligent controller is deployed and control downstream Reader Interface Modules (RIM) or Input/Output Modules (I/OM).
7. The access control hardware shall support the following communication protocols:
  - a. TCP/IP

- b. RS485
- 8. The access control hardware shall be manufactured by Mercury Security Products in Long Beach, CA
- 9. The access control hardware shall consist of the following part numbers:
  - a. Intelligent Controllers
    - i. SSP-D2
    - ii. SSP-EP
    - iii. DController
    - iv. NController
    - v. M5-IC
  - b. Reader Interface Modules
    - i. RSC-1
    - ii. RSC-2
    - iii. NSC-100
    - iv. RSC-DT
    - v. M5-2RP
    - vi. M5-2SRP
    - vii. M5-8RP
  - c. Input/Output Modules
    - i. ISC-16
    - ii. OSC-16
    - iii. M5-20IN
    - iv. M5-16DO
    - v. M5-16DOR
  - d. RS485 Multiplexers
    - i. CI-8
    - ii. OptoHub
    - iii. M5-COM

## Part 3 Execution

### 3.1 EXAMINATION

1. Examine site conditions to determine site conditions are acceptable without qualifications. Notify Owner in writing if deficiencies are found. Starting work is evidence that site conditions are acceptable.

### 3.2 INSTALLATION

1. Integrated Security Management System, including but not limited to access control, alarm monitoring, CCTV, and ID badging system shall be installed in accordance with the manufacturer's installation instructions.
2. Supervise installation to appraise ongoing progress of other trades and contracts, make allowances for all ongoing work, and coordinate the requirements of the installation of the Security Management System.

### 3.3 FIELD TESTING AND CERTIFICATION

1. Testing: The access control, alarm monitoring, CCTV, and ID badging system shall be tested in accordance with the following:
  - a. Conduct a complete inspection and test of all installed access control and security monitoring equipment. This includes testing and verifying connection to equipment of other divisions such as life safety and elevators.
  - b. Provide staff to test all devices and all operational features of the Security Management System for witness by the Owner's representative and authorities having jurisdiction as applicable.
  - c. Correct deficiencies until satisfactory results are obtained.
  - d. Submit written copies of test results.

END OF SECTION

SECTION 28 31 10 - FIRE ALARM

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with the Fire Alarm System, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Furnish and install fire alarm devices to include all addressable signal initiating devices, audible and visual alarm devices, conduit, wire, fittings, and accessories required to provide a complete operating system.
  - 2. Connect to existing Fire Alarm Control Panel in Building 100. Provide all necessary relays, control modules and programming.
  - 3. The specifications require the system to be Simplex. Any contractor requesting consideration for a substitute system shall provide the following documents to the Architect of Record ten (10) days prior to the bid:
    - a. Documentation showing the contractor is a factory direct office of the equipment being considered for substitution. No independent distributors will be allowed.
    - b. The contractor's UL Certificate qualifying the contractor for fire alarm installations.
    - c. Full set of submittals and drawings incorporating the substituted equipment. This shall include location layout, battery calculations of the main control panel and any transponders, and line loss of the signal circuit.

1.02 REFERENCES

- A. The latest editions of the publications listed below, form a part of this specification to the extent required by the references thereto:
  - 1. 2016 California Building Code ( CBC ), Part 2, Title 24, CCR ( 2015 International Building Code with California Amendments )
  - 2. 2016 California Electric Code (CEC), ( 2014 National Electric Code with California Amendments )
  - 3. 2016 California Mechanical Code ( CMC ), Part 4 Title 24, CCR, ( 2015 Uniform Mechanical Code with California Amendments )
  - 4. NFPA #72 2016 Edition with California State Amendments
  - 5. 2016 California Fire Code ( CFC ), Part 9 Title 24, CCR, ( 2015 International Fire Code with California Amendments )
  - 6. Underwriters Laboratories, Inc (UL)
    - 50 Cabinets and Boxes
    - 268 Smoke Detectors, Combustion Products Types for Fire Protective Signaling Systems
    - 38 Manually actuated Signaling boxes for use with Fire Protective Signaling Systems
    - 521 Fire Detection Thermostats
    - 464 Signal Appliances, Audible
  - 7. California State Fire Marshal Listing (CSFM)

- B. Electrical Systems, as specified in Division 26.
- C. Communications Systems, as specified in Division 27.

### 1.03 SUBMITTALS

- A. In addition to the required submittals specified elsewhere, provide California State Fire marshal (CSFM) listings of all devices and equipment to be used.
- B. Provide complete shop drawings of the fire alarm system including the following items on the plans for approval by the School District prior to the start of construction.
  - 1. Complete battery load calculations, and line voltage drop calculations.
  - 2. Conduit size, number, and type of wires to each device, terminal cabinets and enclosures.
  - 3. Location, type and address of all system devices.
  - 4. Reconfiguration (signal and initiating).
  - 5. Complete riser diagrams and signal floor plan. Drawings shall contain State Fire Marshal approval.
  - 6. Backboard layouts (with detailed dimensions).

## PART 2 - PRODUCTS

### 2.01 FIRE ALARM CONTROL PANEL (FACP)

- A. Fire Alarm Control Panel (FACP). The FACP shall be a Simplex 4100.
- B. The system shall be controlled and supervised by a microprocessor based monitoring fire alarm control panel. The systems shall be addressable, field configurable, programmable and editable. The system shall continuously scan devices for change of status. Each device shall have it's own unique address, but shall also be grouped by building as a separate zone for remote annunciation and alarm report purposes.
- C. The fire alarm control panel shall be housed in a lockable, code gauge steel cabinet with 80 character LCD display, master controller operator's panel, I indicating lamps, silence switch and reset switch mounted on cabinet front. The fire alarm control panel shall contain a voice tone generator and a sufficient number of amplifiers in order to provide evacuation tones and digital voice messages throughout the facility. Messages and tones are to be field programmable and initially set to temporal code when an alarm is initiated. An annunciator and message board shall be provided in the main lobby.
- D. The fire alarm control panel shall come with standardized software for on-site customization of the system. The unit shall be capable of providing a 600 event historical log with zone or point selectable alarm verification.
- E. The unit shall support 127 addressable points per module and one output point, SPST contact per zone. Provide the number of modules necessary to control and supervise fire alarm devices as shown on the Drawings, as well as to provide 25% spare capacity).
- F. The fire alarm control panel shall be capable of providing a Walk Test.
- G. The power feed for the FACP shall be 3-wire, 120volt, A.C. single phase (20A circuit) permanently labeled "FIRE ALARM CONTROL POWER", terminating at the master fire alarm control and supervisory panel in the general office and originating at the main electrical switchboard of the

building that contains the FACP. The label shall be red with 1/4" high white lettering. The circuit breaker must be provided with a linc-on device.

- H. In addition to the two A.C. circuits, the panel shall be equipped with a D.C. battery to activate an audible alarm and pilot light in case of a power failure on either A.C. circuit.
- I. Batteries must drive signaling devices per current requirements NFPA 72. Battery calculations are required as part of the submittal. Provide type and wiring configuration of batteries. Submittal shall specify point to point on OHM's Law.
- J. The master fire alarm panel shall be equipped with a manual pull lever type, supervised report station.

## 2.02 FIRE DETECTION DEVICES

- A. With the exception of the manually operated report station required at the master fire alarm panel and large assembly areas, the remainder of the school facility shall be equipped with approved, electronically supervised, automatic fire detection devices, such that every room, space, including concealed spaces, such as the attic spaces above ceilings, etc., is provided with approved coverage.
- B. Automatic fire detection devices shall be True Alarm addressable analog smoke and heat detectors. Where used, heat detectors shall be fixed temperature x rate of rise, fixed at 135°F and a 15°F/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 170°F. Use Simplex True Alarm Photo-Electrical Smoke Detectors. Model #4098-9714 with 4098-9792 Base.
- C. A 3/4" thick, fire resistive, plywood backboard shall be installed in the electric room for the fire alarm security, intercom and CCTV systems at each building. All fire alarm wiring shall terminate on U.L. approved strips on this backboard at a section clearly designated for fire alarm only. All wiring shall be labeled at termination strip. Wiring shall be configured such that all end of line resistors will be installed at terminal strip on signal backboards.

## 2.03 MANUAL FIRE ALARM STATIONS

- A. Manual Fire Alarm Stations shall be an addressable double action, breakglass 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. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of one hundred feet, front or side. Manual Stations shall be constructed of die-formed satin-finished aluminum, with operating directions provided on the cover in depressed red letters. The word FIRE shall appear on each side of the stations in depressed letters, one-half inch in size or larger. Stations shall be suitable for semi-flush mounting on a standard single-gang box or switch plate and shall be provided with a terminal block for connection of Fire Alarm System Wiring. Pull Station shall be Simplex #2099-9795.

1. Manual Pull Stations shall comply with CBC Sections 11B-205 and 11B-403.

## 2.04 ALARM SPEAKER/STROBE DEVICES

- A. Furnish and install where indicated on the drawings, alarm speaker/strobe devices. The audible/visual devices shall be a combination addressable speaker/strobe. The speaker shall be 25 or 70 vrms. The visual shall be rated at 24 vdc.
- B. The audible shall be of rugged vandal-resistant construction. The visual section shall be a strobe using a Xenon flashtube in a clear housing with Solid State circuiting for maximum reliability and efficiency. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater.

The strobe section shall have a minimum intensity rating of 8,000 peak candela with a flash rate of approximately one flash per second.

- C. The alarm speaker/strobe device shall be of the semi-flush type designed for mounting to a standard 4" square deep electrical outlet box. Each device shall be provided with a semi-flush accessory plate. Exterior speakers shall be weatherproof.
- D. Synchronization Requirements: The strobes shall flash at a synchronized rate and the speakers shall sound with synchronized output.

#### 2.05 HEAT DETECTOR DEVICES

- A. Heat detectors shall be addressable, fixed temperature x rate of rise, fixed at 135°F and a 15°F/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 170°F. Heat Detector shall be True Alarm series. Simplex 4098 series.

#### 2.06 SMOKE DETECTOR DEVICES

- A. Smoke detectors shall be True Alarm Analogue addressable, photo-electric. Simplex 4098-9701.
- B. Projected Beam Smoke Detectors shall be Fire Ray Reflective Beam Smoke Detectors. The system comprises of a single unit incorporating an infra-red Transmitter and Receiver. The signal is reflected by a prism and analyzed for smoke presence.

#### 2.07 WIRING

- A. All wiring shall be in accordance with the California Electrical Code (CEC), State Codes, National Fire Protection Association Standard 72, 2010 Edition with state amendments.
- B. All underground conductors for communication circuits shall be West Penn Wire Aqua Seal Fire Alarm Cables. Part No AQZ93.
  - 2. Description: 18/2 Stranded bare copper conductors, overall shield with Aquaseal tape and overall jacket.
  - 3. NEC Rating: FPL – PLTC, NEC Article 760 and 725
  - 4. Approvals: UL Listed-Direct Burial
  - 5. Construction Parameters
    - a. Conductor: 18 AWG Bare Copper
    - b. Stranding: 7x26
    - c. Insulation Material: PVC with Nylon
    - d. Insulation Thickness: Nylon .005" Nominal
    - e. Number of Conductors: 2 ( 1 Pair )
    - f. Shield: 100% Aluminum Polyester Foil
    - g. Jacket Material: Sunlight / Moisture Resistant PVC
    - h. Jacket Thickness: 0.040" Nominal
    - i. Overall Cable Diameter: 0.310" Nominal
    - j. Approximate Cable Weight: 48 lbs / 1M Nom.
    - k. Flame Rating: UL 1685 Vertical Tray
- C. All underground conductors for power circuit shall be XHHW-2.
- D. No splices allowed in underground wiring.

- E. Interior, dry location wiring for low voltage initiating circuits shall be #18 AWG copper, twisted shielded pair minimum, signaling circuits shall be No. 14 AWG minimum, and wiring for 120 volt circuits shall be No. 12 AWG minimum. All wiring shall be color coded, solid copper conductor. Use of power limited cable shall be restricted to controls listed for this purpose. Single conductors shall be type XHHW copper.
- F. Twenty (20) percent spare conductors shall be provided from the main Fire Alarm Control Panel to each Fire Alarm (signal) Terminal backboard. These spares shall be terminated and marked at the Fire Alarm Cabinet and each Terminal backboard.
- G. Wire markers shall be provided for each wire connected to equipment. The marker shall be of the taped bank type, of permanent material, and shall be suitable and permanently stamped with the proper identification. The markers shall be attached in a manner that will not permit accidental detachment. Changing of wire colors within circuits shall be unacceptable.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. The installation shall be accomplished by factory authorized technicians. The factory technician shall be state certified as an FLS technician.
- B. System shall be installed using material, supplies and methods of wiring previously covered under other sections.
- C. Contractor shall provide a complete schematic of terminal to terminal wiring within the FACP and show destination of all wires leaving the FACP. These are to be submitted at the time of final inspection.

#### 3.02 TESTS

- A. Upon completion of installation, the system shall be subjected to operational tests, and when all necessary corrections have been accomplished, the Architect shall be advised and will schedule a final inspection test by a representative of the Owner.
- B. The Contractor shall furnish all instruments, labor, and materials required for the tests and a qualified technician to conduct the tests. Any deficiencies found shall be corrected by the Contractor and system retested as necessary prior to final acceptance. Tests shall be per NFPA 72 and as a minimum shall include the following:
  - 1. Operation of each signal initiating device. Special equipment required for testing ionization detectors and heat detectors shall be provided by the Contractor at the time of the test.
  - 2. Operation of all features of the system under normal operation.
  - 3. Operation of all supervisory features of the system.
  - 4. Operation of all features of the system on standby power with primary powers "OFF".

#### 3.03 DOCUMENTATION

- A. Contractor shall provide the following to DSA, the District, the Architect, and the local fire official at the time of final inspection:
  - 1. As-builts of fire alarm system.
  - 2. NFPA Certificate of Compliance stating that the system has been installed in accordance with approved plans and specifications and Codes.



- a. Provide the NFPA Certificate to the owner, local fire official, architect and DSA.

END OF SECTION 28 31 10

SECTION 31 22 19 FINISH GRADING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Finish Grading, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Import top soil for finish grading.
  - 2. Place and finish grade top soil.

1.02 DEFINITIONS

- A. Definitions in this section include the following:
  - 1. Fill: Soil materials used to raise existing grades.
  - 2. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.
  - 3. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 PROJECT CONDITIONS

- A. Soils Report: A geotechnical investigation report was made for this project and is on file at the College and Architects Office. Soils Report No. LCI LE16089, updated 06/30/16. Landmark Consultants, Inc., 780 North 4th Street, El Centro, CA 92243. (760) 370-3000.
  - 1. All General Contractors and Earthwork Sub-Contractors shall review the soils report prior to commencing any work.
- B. It shall be the responsibility of the Contractor to examine the site of the work and to make all investigation necessary, both surface and subsurface, to determine the character of materials to be encountered and all other existing conditions affecting the work.
- C. The School District shall obtain and pay for the services of a Soils Engineer, who shall be responsible for the review and testing of all import top soil. Contractor shall be responsible to notify Soils Engineer for testing of imported soil.
- D. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Import top soil required for finish grading shall be provided by the contractor from areas outside the site at contractor's expense. Import top soil shall conform to the requirements herein specified. All import top soil shall be tested and approved by geotechnical engineer prior to being hauled to the site.
- B. Imported top soil shall be fertile surface soil (predominantly silt), free from rocks, sticks, obnoxious weeds, roots or seeds, toxic amounts of either acid or alkaline chemicals or other foreign material. Imported top soil shall be approved by Owner's Soil Engineer. Before delivery of top soil, furnish Architect with statement giving location of properties from which top soil is to be obtained and furnish sample.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION AND PREPARATION

- A. Before work is started, verify the location and existence of all bench marks, survey corners and monuments. Protect all bench marks, survey corners and monuments, and if any become displaced, covered or destroyed, employ a civil engineer or surveyor registered in the State of California to reset those points. Permanently reset corners at grade or a maximum of 3" below grade.
- B. Existing Grades: Verify the accuracy of the existing grades as shown on the drawings and report discrepancies to the Architect for verification.
- C. Existing Utilities: Existing utilities shown on the drawings are shown from the best possible information available and shall be verified prior to the start of any work.
- D. Unknown Utilities: In the event that utilities are encountered which are not indicated on the drawings, the existence of which is not known at the date of contract, the Contractor shall give notice in writing to the Architect. The Contractor shall not proceed until adequate investigation has been made, the line identified, and instructions issued as to how to proceed.
- E. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

#### 3.02 PREPARATION OF EXISTING SOIL

- A. Remove all loose or unsuitable soils. Remove all foreign material and any miscellaneous construction debris prior to finish grading.

#### 3.03 FINISH GRADING

- A. Grade the entire site to the required final grade elevations indicated on the drawings. Where no otherwise indicated, site areas shall be given uniform slopes between points for which finished grades are shown, or between such points and existing established grades. Perform cutting, filling, backfilling, and grading necessary to bring the entire area to grades shown on the drawings.
- B. Finish subgrades shall allow for thickness and slopes of subsequent construction. Grade to provide uniform slope between elevation points or lines, or between such elevations and existing grades.
- C. Grade Tolerance: The average plane of all graded areas shall conform to the grades indicated on the plans. Landscape and other large turf areas shall not vary more than 0.1 feet from the specified grade. Cut and fill slopes shall not vary from the specified grade more than 0.5 foot measured at right angles to the slope.

3.04 EARTHWORK BALANCE

- A. Provide and import additional select top soil material, if required, and remove from the site all excess and unsuitable soil.

3.05 CLEANING

- A. Maintain the premises free from accumulation of debris, waste materials, unusable materials, together with excess equipment, tools and other implements of service resulting from operations under this contract.
- B. Debris, waste, or unused construction materials shall not be left about the site, nor shall such refuse be used for fill or backfill.

3.06 PROTECTION OF EXISTING WORK

- A. Protect existing paving, walks, trees, buildings and utilities from damage during installation of new work. Carefully examine the drawings and inspect the site to determine the proximity of such work.

END OF SECTION 31 22 19

SECTION 31 23 00 EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Excavation and Fill, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Excavate native soil.
  - 2. Moisture condition existing native soil.
  - 3. Import and compact engineered fill for structures
  - 4. Import and compact engineered fill for concrete hardscape

1.02 DEFINITIONS

- A. Definitions in this section include the following:
  - 1. Backfill: Soil materials used to fill an excavation.
  - 2. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
  - 3. Excavation: Removal of material encountered above subgrade elevations.
  - 4. Fill: Soil materials used to raise existing grades.
  - 5. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
  - 6. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 PROJECT CONDITIONS

- A. Soils Report: A geotechnical investigation report was made for this project and is on file at the Architects Office. Soils Report No. LE17044. Landmark Consultants, Inc., 780 North 4th Street, El Centro, CA 92243. (760) 370-3000.
  - 1. All General Contractors and Earthwork Sub-Contractors shall review the soils report prior to commencing any work.
- B. It shall be the responsibility of the Contractor to examine the site of the work and to make all investigation necessary, both surface and subsurface, to determine the character of materials to be encountered and all other existing conditions affecting the work.
- C. The School District shall obtain and pay for the services of a Soils Engineer, who shall be responsible for the review and testing of all compaction. Contractor shall be responsible to notify Soils Engineer for testing of each phase of compaction.
- D. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Import materials required for fill or backfill shall be provided by the contractor from areas outside the site at contractor's expense. Import materials shall conform to the requirements herein specified and as required by the soils report. All import materials shall be tested and approved by geotechnical engineer prior to being hauled to the site.
- B. All imported fill soils shall be non-expansive ( Expansion Index less than 10 ) granular soils meeting the USCS classifications or SM, SP-SM, or SW-SM with a maximum rock size of 3 inches and 5 to 20% passing the No. 200 sieve and a minimum sand equivalent of 20.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clearing and Grubbing: All debris or vegetation such as grass, trees, or weeds on the site at the time of construction shall be removed from the construction area. Any root ball should be completely excavated. Organic striplings should be hauled from the site and not be incorporated into any engineered fills. Any trash, construction debris, concrete slabs, old pavement, landfill and buried obstructions such as old foundations and utility lines shall be located by contractor and removed under observation by the geotechnical engineer before site grading. All excavations resulting from site clearing shall be dish-shaped to the lowest depth of disturbance and backfilled with engineered fill as as described below under continuous observation by the geotechnical engineer's representative.
- B. Building Pad Preparation: The existing surface soils within the building pad shall be removed and replaced with non-expansive compacted fill to a minimum depth of 3 feet below the building pad elevation or existing grade whichever is lower. Removal and replacement shall extend at least 5 feet beyond building footprint. After removal the bottom of the excavation shall be scarified to a depth of 8 inches; moisture conditioned to 5 to 10% above optimum moisture content, and recompacted to 85 to 90% of ASTM D1557 maximum density. Imported fill soil shall be placed in the excavation. The imported fill shall be placed in lifts no greater than 8 inches in loose thickness and compacted to a minimum of 95% of ASTM D1557 maximum dry density. The moisture content of the imported fill shall be within 2% of optimum moisture. The moisture content of the imported fill shall be maintained within 2% of optimum moisture at time of compaction.
- C. Concrete Hardscape Preparation: The existing surface soils within the concrete hardscape are shall be removed and replaced with non-expansive compacted fill to a minimum depth of 18 inches below bottom of concrete hardscape. Removal and replacement shall extend at least 1 foot beyond edge of concrete hardscape. After removal the bottom of the excavation shall be scarified to a depth of 8 inches; moisture conditioned to 5 to 10% above optimum moisture content, and recompacted to 85 to 90% of ASTM D1557 maximum density. Imported fill soil shall be placed in the excavation. The imported fill shall be placed in two lifts and compacted to a minimum of 95% of ASTM D1557 maximum dry density. The moisture content of the imported fill shall be within 2% of optimum moisture. The moisture content of the imported fill shall be maintained within 2% of optimum moisture at time of compaction.
- D. Moisture Control and Drainage: The moisture condition of the buildings pad should be maintained during trenching and utility installation until concrete is placed or shall be rewetted before initiating delayed construction. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- E. Utility Trench Backfill: All conduit trenches within the building pad and site concrete shall be backfilled with imported fill material and compacted as required for building pad preparation.

- F. Contractor may encounter existing electrical / signals conduits within the building pad area. Contractor shall be responsible to verify exact location and depth prior to excavation. Contractor shall protect during excavation, moisture conditioning of native soil and placement of imported fill.
- G. Finish Grading: Place native top soil removed from excavation uniformly graded to a smooth surface adjacent to building or concrete hardscape and slope to existing site concrete or native soil elevation.
- H. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. All site preparation and fill placement shall be observed and tested.
  - 1. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
  - 2. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
  - 3. The cost of retesting deficient materials shall be deducted from progress payments to the contractor.
- I. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- J. Unknown Obstacles: Any underground utility service, unnatural condition or obstacle encountered during excavation in unknown to the Owner. Construction shall stop immediately in the vicinity of the encounter until identification is positive and authorization to proceed again in granted by the Owner.

END OF SECTION 31 23 00

SECTION 31 23 33 – TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with Trenching and Backfilling, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes but is not limited to the following:
  - 1. Excavation, backfill and compaction for utilities.
- C. Related Section:
  - 1. Section 33 11 16: Site Water Distribution Piping.
  - 2. Section 33 31 00: Sanitary Sewerage Piping.

1.02 GENERAL PROVISIONS

- A. Contractor is responsible for the accuracy of all layout work and grades. Erect sheeting, shoring and bracing as necessary for protection of persons, improvements, and excavations. Keep excavation free from water and other fluids until backfilling is completed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Backfill material shall be non-expansive granular soils that meet the USCS classifications of SM, SP-SM, or SW-SM, with a maximum rock size of 3 inches, and 5 to 20% passing the No. 200 sieve and a minimum sand equivalent of 20.
- B. Select bedding sand shall be Class A screened fill sand with a maximum particle size of 1-1/2 inches, not to exceed 18 percent, free of expansive materials, debris, and organic matter.

PART 3 - EXECUTION

3.01 TRENCHING

- A. Layout: Lay out route of each underground utility prior to trenching. Review drawings and coordinate with adjacent underground work to avoid conflicts.
- B. Clearances: Maintain required horizontal and vertical depth clearances from structural footings or utility trenches running parallel to footings. Maintain area of footing bearing prism and in event that the utility cannot be relocated or its depth changed, proceed as directed by Architect. Where required, lowering of structural footings to maintain proper clearances for underground utilities trenching shall be accomplished as directed.



- C. Excavate trenches for utilities to required lines, grades and elevations indicated on drawings and as specified. Hand trim changes in direction and bottoms of trenches. Provide shoring in trenches over 5 feet in depth and also in trenches where unstable soil conditions are encountered.
- D. Pipe Trench Dimensions: Following requirements are considered minimal unless drawings indicate otherwise in order to provide adequate pipe clearances and bedding. Provide trenches wider than specified minimum where required to properly install particular type of piping. In event that utility company regulations, code requirements, or pipe manufacturer's recommendations differ from these provisions, most restrictive requirements shall take precedence. Pipe burial depth is from finish grade or pavement surface to top of pipe. Trench width shall be measured at top of pipe.
1. Pipe Burial Depths:

Sewer and Drainage:	24" + pipe O.D. + 3" bed
Gas:	30" + pipe O.D. + 4" bed
Water (Domestic)	
PVC:	30" + pipe O.D. + 4" bed
  2. Trench Width:

Sewer & Drainage:	12" min., 18" max + pipe O.D. for 4" to 18" dia. pipe
Gas:	8" + pipe O.D.
Water (Domestic):	8" + pipe O.D.
- E. Common Trench Requirements:
1. Copper piping or metal gas piping shall not be installed in a common trench with any other dissimilar.
  2. Multiple parallel lines of piping in a common trench shall be separated a minimum of 12 inches, both horizontally and vertically, between individual pipes.
  3. Domestic water piping shall not run parallel in a common trench with sewer or drainage lines.
  4. Electrical power and communications conduit, etc. shall not be run in a common trench with sewer, drainage, water or gas piping.
- F. Additional provisions for Underground Piping within Building Areas: Refer to applicable specification sections of Division 15 and as indicated on drawings.
- G. Requirements for Underground Electrical and Communications Conduit, Ducts, etc.: Refer to applicable specification sections of Division 23 and as indicated on drawings.

### 3.02 BEDDING AND BACKFILLING OF TRENCHING

- A. Bedding: Lay and bed pipe in compacted select bedding sand of thickness specified above, and backfill with same material to a height of 8" above top of pipe. Place in 8" layers and compact to a minimum relative density of 90 percent. Compact in a manner that will not displace or damage pipe.
1. Excavate under bell portions of the piping for uniform bearing.
  2. Conduits and ducts which are laid in a single layer, parallel and in same horizontal plane and which are not concrete encased, shall have bedding as specified above. Select sand bedding for multi-layered banks of unencased conduit shall be water settled but not flooded to fill voids between conduits with sand.
- B. Backfilling: Trenches above top of bedding, and concrete encased utilities, shall be backfilled with select backfill material at optimum moisture content, placed in 6 to 8 inch layers and compacted to a minimum relative density of 90 percent. Trench backfill in pavement or other areas where

compaction greater than 90 percent is required shall be compacted in accordance with those requirements to specified depth.

- C. Do not backfill until installation has been approved. Promptly install pipe after trenching has been done to keep excavation open as short a time as possible.
- D. Underground utility materials requiring special bedding and backfilling methods shall be installed as recommended in conjunction with these materials or as indicated on drawings.

### 3.03 PROTECTION OF WORK FROM FLOODING

- A. Construct all temporary ditches and berms and supply and maintain adequate pumps, piping, and other equipment necessary to protect work, existing structures, and equipment, and to other property located on premises or adjacent thereto, from damage by flooding due to rain or subsurface water. Utility lines shall not be laid in trenches which contain water or that are muddy.

### 3.04 SITE CLEANUP

- A. All excess and unsuitable excavated material shall be removed from site.

### 3.05 FIELD QUALITY CONTROL

- A. Obtain Soils Engineer's approval for excavation, fill materials, method of placing and compaction. Soils Engineer will perform tests to evaluate compliance with specifications.

END OF SECTION 31 23 33

SECTION 32 13 00 SITEWORK CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this Section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Sitework Concrete, as indicated on the Drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.
  - 1. Cast-In-Place concrete sidewalks.
  - 2. Curbs and gutters.
  - 3. Interior and exterior raised concrete planters and benches.
  - 4. Concrete Pavers
- C. Related Sections:
  - 1. Section 31 22 19 Finish Grading

1.02 REFERENCES

- A. ASTM A185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- B. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. ASTM C33 – Concrete Aggregates.
- D. ASTM C94 – Ready-mixed Concrete.
- E. ASTM C150 – Portland Cement.
- F. ASTM C171 – Sheet Materials for Curing Concrete.
- G. ASTM C979 – Pigments for Integrally Colored Concrete.
- H. ASTM D1751 – Preformed Expansion Joint Fillers for Concrete, Paving and Structural Construction.
- I. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
- J. Chapter 19A, California Building Code.

1.03 ACCESSIBILITY REQUIREMENTS

- A. Concrete paving shall be stable, firm, and slip resistant and shall comply with CBC Section 11B-302 and 11B-403.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Layout Drawings: Provide layout drawing showing location of each type of pavement and construction, and dimensioned locations of expansion and control joints. Do not deviate from location of expansion joints and control joints shown on the drawings.
- C. Design Mixtures: Provide design mix for each concrete mixture. Design mix shall include data substantiating the reliability of the proposed mix. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Each design mixture shall be stamped and signed by a registered professional engineer licensed in the state of California.
2. Indicate amounts of mixing water to be withheld for later addition at project site.

D. Product Data

1. Expansion material
2. Curing materials

E. Site Samples

1. Prepare samples indicating slab construction and finish, at the site, cast in the directed locations and orientations. Prepare a minimum 8 foot square sample of each texture and finish required for the project. Include a transverse expansion joint, control joints and edging. Where paving adjoins other material such as pavers, include one edge of sample constructed of the other materials.
2. Approved samples may be part of permanent construction if the sample meets all project requirements and is approved.

1.05 QUALITY ASSURANCE

- A. Sitework Concrete work subject to the provisions of Section 01 45 24, Testing and Inspection Requirements, at the option of the Architect.
- B. Maintain one copy of all records on site.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to Section 1904A.1of CBC and 5.13 of AC1 318-11 when concreting during hot weather.
- E. Conform to Section 1904A.1of CBC and 5.12 of AC1 318-11 when concreting during cold weather. No pouring permitted below 40 degrees Fahrenheit.

1.06 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of embedded sleeves, utilities and components which are concealed from view.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150 – Type V Portlant Type, one manufacturing plant only.
- B. Aggregates: ASTM C33, single source for all materials.
- C. Water: Clean, fresh and potable

2.02 ACCESSORIES

- A. Expansion joints:
  1. Expansion Joint Filler – ASTM D1751: Close cell bituminous saturated fiberboard, ½ inch thick; FIBER EXPANSION JOINT manufactured by The Burke Co., Montebello, CA, or approved equal.

2. Joint Devices: Integral extruded polystyrene plastic; ½ inch thick, with removable top strip exposing sealant trough; JOINT CAPS, manufactured by The Burke Company, or equal.
3. Sealant: Polyurethane two-component type, self leveling, for level surface application, UREXPAN NR-200, manufactured by the Pecora Corp., Harleysville PA, or equal. Color shall be selected by the Architect from manufacturer's standard list of colors.
4. Sealant Primer: As recommended by Sealant Manufacturer.

## 2.03 CONCRETE MIX

- A. Mix and deliver concrete in accordance with Section 1905A, California Building Code.
  1. Deliver concrete in transit mixers only. Mix concrete for 10 minutes minimum at a peripheral drum speed of approximately 200 feet per minute. Mix at jobsite minimum 3 minutes. Discharge loads in less than 1-1/2 hours or under 300 revolutions of the drum, whichever comes first, after water is first added.
  2. Design Mix: Conform to 1904A.2 California Building Code.
  3. A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under this provision.
  4. Selection of Concrete Proportions: Concrete proportions shall be determined in accordance with the provisions of ACI 318, Section 5.2.
  5. Quantities of Materials: Provide Weighmaster's Certificate for each load of concrete.
  6. Do not exceed 0.45 water-cement ratio, by weight.
  7. Concrete shall be mixed by transit mixers only.
- B. Required Strength: Minimum 4,500 psi for sitework concrete.

## 2.04 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615; 40 ksi yield grade; deformed billet steel bars, uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A185; in flat sheets; uncoated finish, 6 x 6 inch, No. 6 gage.
- C. Tie Wire: Annealed steel, minimum 16 gage size.
- D. Dowels: ASTM A615; 40 ksi yield grade, deformed steel, uncoated finish.
- E. Fiber Reinforced Concrete
  1. FIBERMESH 150: ASTM C 1116/C 1116M, Type III Fiber Reinforced Concrete. Manufactured by PROPOX CONCRETE SYSTEMS. 100% virgin homopolymer polypropylene multifilament fibers containing no reprocessed olefin materials. Provide 1.0 – 1.5 lbs. per cubic yard.
  2. FIBERMESH 650: ASTM C 1116/C 1116M, Type III Fiber Reinforced Concrete. Manufactured by PROPOX CONCRETE SYSTEMS. Alloy polymer macro-synthetic fiber featuring e3 patented technology manufactured to an optimum gradation and highly oriented to allow greater surface area contact within the concrete resulting in increased interfacial bonding and flexural toughness efficiency. Provide a minimum of 3.0 lbs. per cubic yard

## 2.05 CURING MATERIALS

- A. Polyethylene Film ASTM C171; 8 mil thick, clear, manufactured from virgin resin with no scrap or additives. POLYETHYLENE, No. 227, manufactured by The Burke Co., Montebello, CA, or equal.

- B. Water: Potable and not detrimental to concrete.
- C. Curing Compound: ASTM C309; wax resin base, WHITE PIGMENTED CURING COMPOUND, by The Burke Co., Montebello, CA, or equal.

2.06 COLORED CONCRETE

- A. Provide colored concrete as marked on the AS ( Architectural Site ) Sheets. Colored concrete shall be as selected by Architect from the DAVIS COLORS color chart. Color Group: Standard.

2.07 PAVERS

- A. Concrete Pavers shall be WAUSAU TILE Type 3, 24" x 24" x 2 3/4". Provide (2) colors: FDX 5008 Tan and FDX 3008 Gray.
- B. Pavers for ADA curb ramps shall be WAUSAU TILE ADA-1 Precast Concrete Truncated Domes, 24" x 24" x 2 3/4". Color shall be Yellow 33538 per Federal Standard 595B.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify site concerns.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

3.03 PLACING CONCRETE (GENERAL)

- A. Convey and deposit concrete in accordance with Section 1905A, California Building Code. Remove loose dirt from excavations.
- B. Notify Job Inspector minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and accessories are not disturbed during concrete placement.
- D. Ensure sub-base or base materials have been compacted or otherwise treated.
- E. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- F. Place concrete continuously between predetermined expansion joints.

- G. Do not interrupt successive placement; do not permit cold joints to occur. Avoid segregation of materials. Perform tamping and vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.
- H. Do not allow concrete to fall free from any height which will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet.
- I. Defective Installation: Repair and clean at Contractor's expense all concrete damaged or discolored during construction. Where concrete requires repair before acceptance, the repair shall be made by removing and replacing entire section between joints and not by refinishing the damaged portion.
- J. Proper curing of concrete surfaces is the responsibility of the Contractor. Concrete failing to meet specified strength shall be removed and replaced.

### 3.04 ON-SITE CONCRETE SIDEWALKS AND RAMPS

- A. Forms, Wood: Free from warp, with smooth and straight upper edges, surfaced one side, minimum thickness 1-1/2 inches adequate to resist springing or deflection from placing concrete.
- B. Forms, Metal: Gage sufficient to provide equivalent rigidity and strength.
- C. Reinforcement: Unless indicated otherwise on the drawings, provide welded steel wire fabric, 6 inches by 6 inches, No. 6 gage at mid-height of sidewalks and ramps. Interrupt reinforcement at expansion joints.
- D. Concrete Placement: Dampen subgrade to retain moisture in concrete mix. Tamp and spade to consolidate concrete for entire length of pour. Strike off upper surface to specified grades.
- E. Expansion Joint: Locate joint filler as shown on drawings or at maximum 60 feet centers and where slabs join vertical surfaces. Install vertically, full depth of concrete leaving plastic cap at 1/2 inch depth at top for sealant application.
  - 1. Provide 1/2 inch diameter greased steel dowels, 12 inches long at expansion joints with one end of dowel lubricated to allow for longitudinal movement. Spacing: 16 inches on center maximum, 6 inches from edges.
  - 2. Remove plastic caps. Prime both sides of joint and apply self-leveling sealant. Provide smooth concave surface.
- F. Control Joints – Saw Cut: After floating and finishing, saw cut concrete to a depth of: depth of concrete/4. Curved or non-aligned joints not acceptable. Sealant application not required. Space joints 12 ft maximum oc both ways or as patterned on the drawings.
- G. Finish:
  - 1. Screed concrete to required grade, float to a smooth, flat, uniform surface. Edge all headers to 1/4 inch radius. Edge expansion joints to 1/4 inch radius. Steel trowel to hard surface.
  - 2. Grades less than 6 percent: After final troweling, apply a medium hard broom finish transverse to centerline or direction of traffic.
  - 3. Grades 6 percent or more: Apply slip resistant heavy broom finish and remark as necessary after final finish to assure neat uniform edges, joints and score lines.
  - 4. Walkway grades in excess of five percent shall conform to Section 1133B.7, California Building Code.
- H. Curing: Cure surfaces utilizing one of the following methods:

1. Spraying: Spray water over slab areas and maintain wet for 7 days.
2. Spread polyethylene film over slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for 7 days.
3. Apply liquid curing compound at rate of 200 sf per gallon, using power sprayer equipped with agitator. Do not apply liquid curing compound to surfaces scheduled to receive paving units of any kind.

3.05 RAISED PLANTER, BENCHES AND SIMILAR SITE STRUCTURES

- A. Forms: Suitable material and type, size, shape, quality and strength to insure construction as designed, true to line and sufficiently rigid to resist deflection during placing of concrete. Clean forms of all dirt, mortar and foreign matter before use.
- B. Reinforcement: Refer to drawings for size and spacing. Place accurately and hold in position, using metal chairs, spacers, metal hangers, supporting wires and other devices of sufficient strength to resist crushing under full load. Clean reinforcing steel of mortar, oil, dirt, loose or thick rust and coatings.
- C. Coordinate installation of conduits or other inserts.
- D. Finish: Provide a smooth, straight, plumb and acceptable finish without burrs or form marks. Cement sacking is not acceptable.
- E. Curing: Cure surfaces utilizing one of the following methods:
  1. Spraying: Spray water over slab areas and maintain wet for 7 days.
  2. Spread polyethylene film over slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for 7 days.
  3. Apply liquid curing compound at rate of 200 sf per gallon, using power sprayer equipped with agitator. Do not apply liquid curing compound to surfaces scheduled to receive paving units or finish of any kind.

3.06 CURB AND GUTTER

- F. Subgrade Preparation: Subgrade material, base material and compaction requirements as approved by the Geotechnical Engineer.
- G. Forms: Single face type required, cut to conform exactly with face batter and radius, sufficiently rigid to resist springing or deflection from concrete placement. Clean forms of all loose dirt, mortar or similar materials and apply a light coating of oil or other suitable material prior to concrete placement.
  1. Slip Forms: contractor's option upon approval of the Architect.
- H. Reinforcement: Refer to drawings for size and spacing. Interrupt reinforcement at expansion joints.
- I. Concrete Placement: Dampen subgrade to retain moisture in concrete mix. Tamp and spade to consolidate concrete to entire length of pour. Strike off upper surface to specified grades. Cut drain pipes to conform to curb batter.
- J. Expansion Joints: Locate joint filler as shown on drawings, or at maximum 20 foot centers. Trim off excess filler material flush to finish surface. No sealant application required.



- K. Finish: Trowel to a smooth and even finish with a fine hair broom applied parallel with the line of the work. Round all edges to ½ inch radius. No Contractor identification permitted.
  
- L. Curing: Cure surfaces utilizing one of the following methods:
  - 1. Spraying: Spray water over curb and gutter and maintain wet for 7 days.
  - 2. Spread polyethylene film over areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for 7 days.
  - 3. Apply liquid curing compound at rate of 200 sf per gallon, using power sprayer equipped with agitator.

END OF SECTION 32 13 00

SECTION 32 13 13 – CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Concrete Paving, as indicated on the Drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following.

- 1. Concrete paving as indicated on Drawings.

1.02 REFERENCES

- A. ASTM A185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- B. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. ASTM C33 – Concrete Aggregates.
- D. ASTM C94 – Ready-mixed Concrete.
- E. ASTM C150 – Portland Cement.
- F. ASTM C171 – Sheet Materials for Curing Concrete.
- G. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
- H. ASTM D1751 – Preformed Expansion Joint Fillers for Concrete, Paving and Structural Construction.
- I. Chapter 19A, California Building Code.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
  - 1. Design Mixtures: Provide design mix for each concrete mixture. Design mix shall include data substantiating the reliability of the proposed mix. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
    - 1. Each design mixture shall be stamped and signed by a registered professional engineer licensed in the state of California.
    - 2. Indicate amounts of mixing water to be withheld for later addition at project site.
- B. Submit product data.
- C. Submit Placement Schedule providing details or sketches showing location of each proposed placement. Do not deviate from location of expansion joints or scorelines shown on the drawings.
- D. Submit product data on joint filler, sealants, curing compounds and reinforcing.

1.04 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of embedded sleeves, utilities and components which are concealed from view.

1.05 QUALITY ASSURANCE

- A. Sitework Concrete work subject to the provisions of Section 01 45 24, Testing and Inspection Requirements for School Construction, at the option of the Architect.
- B. Maintain one copy of all records on site.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to Section 1905A.13, California Building Code, when concreting during hot weather.
- E. Conform to Section 1905A.12, California Building Code, when concreting during cold weather. No pouring permitted below 40 degrees Fahrenheit.

## PART 2 - PRODUCTS

### 2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150 – Type 1 – Normal or Type II – Moderate, Portlant Type, one manufacturing plant only.
- B. Aggregates: ASTM C33, single source for all materials.
- C. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; SUPER POR-ROK ANCHORING CEMENT, by Minwax Construction Products Division, Montvale, NJ., or equal.

### 2.02 ACCESSORIES

- A. Expansion Joints:
  - 1. Expansion Joint Filler – ASTM D1751: Close cell bituminous saturated fiberboard, ½ inch thick; FIBER EXPANSION JOINT manufactured by The Burke Co., Montebello, CA, or equal.
  - 2. Construction Joint Devices: Integral extruded polystyrene plastic; ½ inch thick, with removable top strip exposing sealant trough; JOINT CAPS, manufactured by The Burke Company, or equal.
  - 3. Sealant: Polyurethane two-component type, self leveling, for level surface application, UREXPAN NE-200, manufactured by the Pecora Corp., Harleysville PA, or equal.
  - 4. Primer: As recommended by Sealant Manufacturer.
  - 5. Slip Resistant Finish: Dry Shake Type; Aluminum Oxide surface treatment, hexagonal alumina crystals with a hardness measuring 9 on the Mohr's scale, by the Burke Co. San Mateo, CA or equal.

### 2.03 CONCRETE MIX

- A. Mix and deliver concrete in accordance with Section 1905A, California Building Code.
  - 1. Deliver concrete in transit mixers only. Mix concrete for 10 minutes minimum at a peripheral drum speed of approximately 200 feet per minute. Mix at jobsite minimum 3 minutes. Discharge loads in less than 1-1/2 hours or under 300 revolutions of the drum, whichever comes first, after water is first added.
  - 2. Design Mix: Conform to 1905A.2 – 1905A.6, California Building Code.
  - 3. A registered civil engineer with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use under this provision.

- 4.. Selection of Concrete Proportions: Concrete proportions shall be determined in accordance with the provisions of ACI 318, Section 5.2.
5. Quantities of Materials: Provide Weighmaster's Certificate for each load of concrete.
6. Do not exceed 0.45 water-cement ratio, by weight.
7. Concrete shall be mixed by transit mixers only.

B. Required Strength: Minimum 4,500 psi for sitework concrete.

#### 2.04 REINFORCEMENT

A. Reinforcing Steel: ASTM A615; 40 ksi yield grade; deformed billet steel bars, uncoated finish.

B. Tie Wire: Annealed steel, minimum 16 gage size.

C. Dowels: ASTM A615; 40 ksi yield grade, deformed steel, uncoated finish.

D. Fiber Reinforced Concrete

1. FIBERMESH 150: ASTM C 1116/C 1116M, Type III Fiber Reinforced Concrete. Manufactured by PROPOX CONCRETE SYSTEMS. 100% virgin homopolymer polypropylene multifilament fibers containing no reprocessed olefin materials. Provide 1.0 – 1.5 lbs. per cubic yard.
2. FIBERMESH 650: ASTM C 1116/C 1116M, Type III Fiber Reinforced Concrete. Manufactured by PROPOX CONCRETE SYSTEMS. Alloy polymer macro-synthetic fiber featuring e3 patented technology manufactured to an optimum gradation and highly oriented to allow greater surface area contact within the concrete resulting in increased interfacial bonding and flexural toughness efficiency. Provide a minimum of 3.0 lbs. per cubic yard

E.

#### 2.05 CURING MATERIALS

A. Polyethylene Film ASTM C171; 8 mil thick, clear, manufactured from virgin resin with no scrap or additives. POLYETHYLENE, No. 227, manufactured by The Burke Co., Montebello, CA, or equal.

B. Water: Potable and not detrimental to concrete.

C. Curing Compound: ASTM C309; wax resin base, WHITE PIGMENTED CURING COMPOUND, by The Burke Co., Montebello, CA, or equal.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

A. Verify site conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

#### 3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 PLACING CONCRETE (GENERAL)

- A. Place concrete in accordance with Section 1905A, California Building Code. Remove loose dirt from excavations.
- B. Notify Job Inspector minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and accessories are not disturbed during concrete placement.
- D. Ensure sub-base or base materials have been compacted or otherwise treated as required by the Geotechnical Engineer.
- E. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- F. Place concrete continuously between predetermined expansion joints.
- G. Do not interrupt successive placement; do not permit cold joints to occur. Avoid segregation of materials. Perform tamping and vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.
- H. Do not allow concrete to fall free from any height which will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet.
- I. Defective Installation: Repair and clean at Contractor's expense all concrete damaged or discolored during construction. Where concrete requires repair before acceptance, the repair shall be made by removing and replacing entire section between joints and not by refinishing the damaged portion.
- J. Proper curing of concrete surfaces is the responsibility of the Contractor. Concrete failing to meet specified strength shall be removed and replaced.

3.04 CONCRETE PAVING

- A. Forms, Wood: Free from warp, with smooth and straight upper edges, surfaced one side, minimum thickness 1-1/2 inches adequate to resist springing or deflection from placing concrete.
- B. Forms, Metal: Gage sufficient to provide equivalent rigidity and strength.
- C. Reinforcement: Unless indicated otherwise on the drawings, provide No. 3 bar at 18" o.c. each way mid-height of slabs. Interrupt reinforcement at expansion joints.
- D. Concrete Placement: Dampen subgrade to retain moisture in concrete mix. Tamp and spade to consolidate concrete for entire length of pour. Strike off upper surface to specified grades.
- E. Expansion Joint: Locate joint filler as shown on drawings or at maximum 15 feet centers and where slabs join vertical surfaces. Install vertically, full depth of concrete leaving plastic cap at 1/2 inch depth at top for sealant application.

1. Provide ½ inch diameter smooth steel dowels, 14 inches long at expansion joints with one end of dowel lubricated and set in capped sleeve to allow for longitudinal movement. Spacing: 24 inches on center maximum, 6 inches from edges.
- F. Control Joints – Saw Cut: After floating and finishing, saw cut concrete to a depth of: depth of concrete/4. Curved or non-aligned joints not acceptable. Sealant application not required. Space joints 5 ft oc both ways or as patterned on the drawings.
- G. Control Joints: After floating, cut wet concrete with jointer tool to a depth of: depth of concrete/4. Smooth trowel joints and edges to ¼ inch radius with jointer tool. Curved or non-aligned joints not acceptable. Sealant application not required. Space joints 5 ft oc both ways or as patterned on the drawings.
- H. Finish:
1. Screed concrete to required grade, float to a smooth, flat, uniform surface. Edge all headers to ¼ inch radius. Edge expansion joints to ¼ inch radius. Steel trowel to hard surface.
  2. Grades less than 6 percent: After final troweling, apply a medium hard broom finish transverse to centerline or direction of traffic.
  3. Grades 6 percent or more: Apply slip resistant heavy broom finish and remark as necessary after final finish to assure neat uniform edges, joints and control joints.
- I. Curing: Cure surfaces utilizing one of the following methods:
1. Spraying: Spray water over slab areas and maintain wet for 7 days.
  2. Spread polyethylene film over slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for 7 days.
  3. Apply liquid curing compound at rate of 200 sf per gallon, using power sprayer equipped with agitator. Do not apply liquid curing compound to surfaces scheduled to receive paving units or finish of any kind.

END OF SECTION 32 13 13

SECTION 32 17 23 PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Pavement Marking, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Accessible parking spaces. Provide accessible spaces limited to Keynote 9, 20 and 21 as per Sheet AS1.

1.02 REFERENCES

- A. SSPWC – Standard Specifications for Public Works Construction, 1997 Edition.
- B. AQMD – Air Quality Management District.
- C. Fed Std 595c – Colors Listed in Government Procurement.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit product data.
- C. Submit shop drawing layout of accessible parking spaces, indicating stalls, lettering, safety zones, widths of lines and colors.
- D. Field Samples:
  - 1. Provide field sample under the provisions of Section 01 33 00, Submittal Procedures.
  - 2. Provide field sample in the form of one parking lot stall, illustrating coating color, width of stroke, thickness of application and dimensioning.
  - 3. Locate where approved.
  - 4. Accepted sample may remain as part of the work.
  - 5. Do not proceed with pavement marking until sample panel has been approved.

1.04 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality traffic line paint products with ten years experience.
- B. Applicator: Company specializing in commercial pavement painting with five years experience.
- C. Regulatory Requirements:
  - 1. Conform to Federal Regulations concerning lead content of paints.
  - 2. Conform to AQMD, Local Regulations.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site in sealed and labeled containers.
- B. 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.
- C. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, unless otherwise recommended by the manufacturer.

1.06 EXTRA STOCK

- A. Provide a one gallon unopened container of each color to the Owner.
- B. Label each container with color in addition to the manufacturer's label.

1.07 ACCESSIBILITY REQUIREMENTS

- A. Accessible parking spaces serving a particular building or facility shall be located, and dispersed if serving more than one accessible entrance, on the shortest accessible route to an entrance or to multiple accessible entrances. CBC Section 11B-208.3.1.
- B. Accessible parking spaces in a parking facility not serving a particular building or facility shall be located on the shortest accessible route to an accessible pedestrian entrance of the parking facility. CBC Section 11B-208.3.1
- C. Minimum number of required accessible parking spaces shall be provided in accordance with CBC Table 11B-208.2 for each parking facility provided.
- D. For every six or fraction of six accessible parking spaces, at least one shall be an accessible van parking space. CBC Section 11B-208.2.4.
- E. Accessible parking spaces and access aisles shall comply with CBC Section 11B-502 and shall be dimensioned to the centerline of the marked lines as follows:
  - 1. Parking spaces and access aisle shall be marked according to CBC Figures 11B-502.2, 11B-502.3 and 11B502.3.3. Their surfaces shall comply with CBC Section 11B-302 and shall be at the same level with slopes not steeper than 1:48 in any direction. CBC Section 11B-502.4
  - 2. Parking spaces shall be 9'x18' minimum and van parking spaces shall be 12'x18' minimum with an adjacent access aisle of 5'x18' minimum. Access aisles shall be placed on either side of the parking spaces except be located on the passenger side for van parking spaces. Van parking spaces shall be permitted to be 9'x18' minimum where the access aisle is 8'x18' minimum.
  - 3. Access aisles shall be marked by a blue painted borderline around their perimeter. The area within the blue borderlines shall be marked with hatched lines a maximum of 36" on center in a color contrasting with that of the aisle surface, preferably blue or white. Access aisle markings may extend beyond the minimum required length. CBC Section 11B-502.2.3.3
  - 4. Access aisles ( parking spaces as well – similar application ) shall not overlap the vehicular way. CBC Section 11B-502.3.4.
  - 5. A vertical clearance of 8'-2" minimum shall be provided for accessible parking spaces, access aisles, and vehicular routes serving them. CBC Section 11B-502.5.
- F. At least one passenger loading zone shall be provided in every continuous 100 linear feet of loading zone space, or fraction thereof, complying with CBC Sections 11B-209 and 11B-503 as follows:



1. Vehicle pull-up spaces shall be 8'x20' minimum. Access aisles shall be 5'x20' minimum and shall be adjacent and parallel to the vehicular pull-up spaces. They shall be at the same level with slopes not steeper than 1:48 in any direction. CBC Section 11B-503.4
2. Access aisles for passenger drop-off and loading zone shall be marked with a painted borderline around their perimeter. The area within the borderlines shall be marked with hatched lines a maximum of 36" on center in a color contrasting with that of the aisle surface. CBC Section 11B-503.3.
3. A vertical clearance of 9'-6" minimum shall be provided for vehicle pull-up spaces, access aisles, and a vehicular route serving them connecting a vehicular entrance and a vehicular exit. CBC Section 11B-503.5

G. Bus loading zones and bus stops shall comply with CBC Section 11B-209 and 11B-810.2 as follows:

1. Boarding and alighting areas shall be of 8'x5' minimum, with 8' measured perpendicular to the curb or vehicle roadway edge, and with 5' measured parallel to the vehicle roadway. Slopes in 8' direction shall be 1:48 maximum. Slopes in 5' direction shall be the same as that of the roadway, the maximum extent practicable. CBC Figure 11B-810.2.2
2. Bus shelters shall provide a minimum 30"x48" clear floor or ground space ( 36"x 48" or 36" x 60" as applicable in an alcove ), with slopes not steeper than 1:48 in any direction, entirely within the shelter complying with CBC Section 11B-305.
3. Bus shelters shall be connected by an accessible route complying with CBC Section 11B-402 to a boarding and alighting area complying with CBC Section 11B-810.2 CBC Figure 11B-810.3

H. Detectable Warning Surfaces:

1. Detectable warning surfaces shall comply with CBC Section 11B-705.1.
2. Detectable warning surfaces shall be yellow conforming to FS 33538 of Federal Standard 595C, except for locations at curb ramps, islands, or cut-through medians where color used shall contrast visually with that of adjacent walking surfaces, either light-on-dark, or dark-on-light. CBC Sections 11B-705.1.1.3 and 11B-705.1.1.5.
3. Detectable warning surfaces shall differ from adjoining surfaces in resiliency or sound-on-cane contact. CBC Section 11B-705.1.1.4.
4. Provide minimum 5 year warranty per DSA Bulletin 10/31/02, revised 04/09/08.

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. Manufacturers:

1. Products of the following manufacturer or supplier form the basis for design and quality intended.
  - a. ICI/Sinclair Paint, Commerce, CA.
2. Equal products of the following may be submitted for approval.
  - a. Dunn-Edwards Corporation, Los Angeles, CA.
  - b. Frazee Paint and Wallcovering, Inc., City of Commerce, CA.
  - c. or approved equal.

### 2.02 MATERIALS

A. Traffic Line Paint:

1. ICI/Sinclair: No. 160 VINYL TRAFFIC PAINT.
2. Dunn-Edwards: VIN-L-STRIPE TRAFFIC PAINT, VINYL EPOXY EMULSION, W801.
3. Frazee: No. 502 TRAFFIC LINE PAINT.

2.03 COLORS

- A. Accessible Parking Stalls and Signage: Blue, conforming to No. 15090 Fed. Std 595C.
- B. Parking stalls, lettering, arrows and traffic signage: Yellow on concrete paving, White on AC paving.
- C. Stalls: Single line, 4 inches wide.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

3.02 APPLICATION

- A. Surfaces to be painted shall be clean and free of dust, dirt, grease, oil, water or other contaminants.
  1. Existing lines to be removed shall be sandblasted clean.
- B. Traffic paint shall not be applied until seal coat has been in place a minimum of ten days.
- C. Apply material by machine spray, airless sprayer, roller or brush to provide a minimum thickness of 12 mils average. Precise edges required, no overspray allowed.
- D. Perform work in accordance with approved shop drawings. Conform to Section 310-5.6.8, SSPWC.

3.03 DEFECTIVE WORK

- A. Remove any paint which demonstrates evidence of checking, cracking, peeling, discoloration, lack of bonding or poor coverage. Misplaced lines shall be completely removed by paint remover or sandblasting. Painting over misplaced lines will not be permitted. Conform to Section 310.5.6.3, SSPWC.

END OF SECTION 32 17 23

SECTION 32 84 00 LANDSCAPE IRRIGATION SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Landscape Irrigation System, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not necessarily limited to, the following:
  - 1. Trenching and backfill
  - 2. Installation of automatically controlled irrigation system
  - 3. Test all systems and make operative
  - 4. Provide “As-Built” drawings.
- C. Automatic Sprinkler Irrigation Systems and Controls:
  - 1. It is the intent of the Contract Drawings and Specifications that the irrigation system be complete in every respect and shall be ready for satisfactory operation as determined by the Architect.
- D. Related Sections:
  - 2. Section 32 91 00 – Planting Preparation: Preparation of planting areas to be coordinated with irrigation system installation.
  - 3. Section 32 93 00 – Landscape Planting: Plant materials to be irrigated.
  - 4. Section 32 97 00 – Landscape Maintenance: Maintenance of irrigation system under the Contract.

1.02 SUBMITTALS

- A. Product Data: Manufacturer’s descriptive literature and manufacturer’s installation instructions and recommendations.
- B. Materials List: Submit complete list of all irrigation system materials, manufactured products and processes proposed to be provided under the Contract.
  - 1. Materials list shall include manufacturer’s name and catalog numbers.
  - 2. Prepare typewritten material list using the following format. Double space between each item:

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER</u>	<u>MODEL NO.</u>
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- C. Quality Control Submittals:
  - 1. Test Reports: When necessary, and as directed by the Architect (Landscape Architect), submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work specified in this section.
  - 2. Certifications: Provide that electrical wiring, controls, motors, and devices be listed and labeled by Underwriters Laboratories, Inc. (UL).
  - 3. Manufacturer’s Instructions: Submit the manufacturer’s recommended methods of installation, including relevant limitations.

- D. Contract Closeout Submittals: Comply with requirements specified in Section 01 77 00 – Contract Closeout Procedures.
1. Project Record Drawings: Record information on daily basis. Prepare and submit project record drawings in accordance with procedures specified in Section 01 78 39 – Project Record Documents.
    - a. Record accurately on one set of Contract Drawings the locations of all above- and below-grade elements of irrigation system.
    - b. Note dimensions from two permanent points of reference such as building corners, sidewalks, or curbs and note installed depths of the following items:
      - i. Project Record Drawings: Record information on daily basis. Prepare and submit project record drawings in accordance with procedures specified in Section 01 78 39 – Project Record Documents Routing of main pressure lines, with dimensions at maximum of 100 feet intervals.
      - ii. Routing of control and common wiring.
      - iii. Connection to electrical power.
      - iv. Irrigation controllers.
      - v. Electric remote control valves.
      - vi. Connection to water source.
      - vii. Backflow preventer and water meter, if applicable.
      - viii. Gate and ball valves.
      - ix. Quick coupling valves.
      - x. Related components (as may be directed).
      - xi. Other related equipment.
  2. Controller Charts:
    - a. Prepare charts after Project Record Drawings have been reviewed and accepted by Architect.
    - b. Provide one chart for each automatic controller as follows:
      - i. Chart shall be a reproduction of the Record Drawings, if the scale permits fitting onto the controller door. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility.
      - ii. Chart shall be blackline print of the actual As-Built system, showing the area covered by the controller.
      - iii. Provide one chart for each controller.
    - c. Identify the area of coverage of each remote control valve, using a distinctly different translucent pastel color, drawn over the entire area of coverage.
    - d. Following acceptance, hermetically seal charts between two layers of 10-mil thick plastic sheet.
  3. Checklists: Provide two copies of signed and dated checklist and submit prior to completion review of the work.
    - a. Use the following format:
      - i. Plumbing Permits: If not required, so note.
      - ii. Materials Reviews: Accepted by and date.
      - iii. Pressure Line Tests: By whom and date.
      - iv. Record Drawings: Received by and date.
      - v. Controller Charts: Received by and date.

- vi. Materials and Equipment Furnished: Received by and date.
  - vii. Operating and Maintenance Data: Received by and date.
  - viii. System and Equipment Operation Instructions: Received by and date.
  - ix. Manufacturer's Warranties (if required): Received by and date.
  - x. Written Guarantee: Received by and date.
  - xi. Lowering of Heads in Lawn Areas: If incomplete, so state.
  - xii. Manufacturers and phone numbers.
- b. Include index sheet stating contractor's and equipment manufacturer's name, address, and phone number.
4. Operation and Maintenance Manuals: Prepare and submit operation and maintenance manuals.
- a. Two individually bound copies of operation and maintenance manuals shall be delivered as directed, at least 10 calendar days prior to completion review. Manuals shall describe the material installed and the proper operation of the system.
  - b. Each complete, bound manual shall include the following information:
    - i. Index sheet stating Contractor's address and telephone number, duration of guarantee period, list of equipment including names and addresses of local manufacturer representatives.
    - ii. Operating and maintenance instructions for all equipment.
    - iii. Spare parts lists and related manufacturer information for all equipment.
5. Warranty Forms: Prepare and submit warranty documents.

### 1.03 QUALITY ASSURANCE

#### A. Qualifications:

1. Installers Qualifications: Regularly engaged, and specializing, for the preceding 5 years, in the installation of equivalent irrigation systems using solvent-gasket joints.

#### B. Regulatory Requirements:

1. Comply with all local, municipal, and state laws, and rules and regulations.
2. Conform to applicable provisions of the latest editions of California Plumbing Code (CPC), California Electrical Code (CEC) and all rules, ordinances and regulations of authorities having jurisdiction, including serving utility agencies.
3. Electrical materials and installation shall conform to requirements specified in Division 26 – Electrical.
4. All local, municipal, and state laws, rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.
5. The Contractor shall secure the required licenses and permits, make payments of charges and fees, give required notices to public authorities, and verify permits secured or arrangements made by others affecting the work specified in this section.

#### C. Coordination:

1. Contractor shall coordinate installation of irrigation system with paving work specified in other sections for provision of necessary sleeving.
2. Prior commencing work specified in this section, Contractor shall carefully review and coordinate work specified in this and other sections to ensure that all such work is complete to the point where installation of irrigation system may properly commence.
3. Verify that irrigation system may be installed in accordance with applicable codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

D. Field Measurements:

1. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other work.
2. All scaled dimensions are approximate. The Contractor shall check and verify all scaled dimensions prior to proceeding with work under this section.

- E. Pre-installation Conference: Before work commences, schedule a conference with the Architect and Owner's representative regarding requirements of the work specified in this section.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver materials bundled, in manufacturer's original packaging and with identifying labels and markings affixed and legible. Exercise care in handling, loading, unloading, and storing plastic pipe and fittings under cover until ready to install. Transport plastic pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load.
- B. Storage: Store materials off-ground and protected from damage. Store pipe flat and fully supported.
- C. Protection: Use all means necessary to protect irrigation system materials before, during, and after installation and to protect the installation work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary for acceptance by Architect and Owner and with no change in contract sum and contract time. Damaged materials shall be discarded and replaced with new materials.

1.05 WARRANTY

- A. The entire sprinkler system, including all work done under the contract, shall be unconditionally guaranteed against all defects and fault of material and workmanship, including settling of backfilled areas below grade, for a period of one year following the filing of the Notice of Completion. Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor within 10 calendar days of receipt of written notification from Owner, at no cost to Owner. When the nature of the repairs constitute an emergency (i.e., broken pressure line), Owner may proceed to make repairs at the Contractor's expense. Any damages to existing improvements resulting either from faulty workmanship, or from the necessary repairs to correct same shall be repaired to the satisfaction of the Owner by the Contractor, all at no change in contract sum.
- B. During the warranty period, the Owner reserves the right to make temporary repairs as necessary to maintain the irrigation system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the warranty.
- C. Any settling of trenches which may occur during the one-year period following acceptance shall be repaired to the Owner's satisfaction by the Contractor without any additional expense to the Owner.

Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the repair work.

#### 1.06 INSTRUCTION OF OWNER'S PERSONNEL

- A. Instruction of Owner's Personnel: Provide instruction and demonstrations to Owner's maintenance personnel in proper operation and maintenance of irrigation system.
  - 1. At the time of the pre-maintenance period site observation visit, Architect, Owner's authorized representative, and authorities having jurisdiction will review completed work, and if not accepted, will prepare a list of items to be completed, modified and replaced by Contractor. At the time of the post-maintenance period or final field observation visit, Work will be re-observed and final acceptance will be in writing by the Architect, Owner's authorized representative, and (if applicable) authorities having jurisdiction.
  - 2. Owner's authorized representative shall have final authority on all portions of the work.
  - 3. After the system has been completed, the Contractor shall instruct Owner's authorized personnel in the operation and maintenance of the irrigation system and shall furnish a complete set of operating and maintenance instructions.

#### 1.07 MAINTENANCE

- A. Maintenance: Maintain the entire irrigation system under full automatic operation for a period of 7 days prior to any planting, and for period up to commencement of maintenance period, in accordance with Section 32 97 00 – Landscape Maintenance.
- B. Miscellaneous Items: Furnish the following tools as part of this contract:
  - 1. Two sets of keys for each automatic controller cabinet.
  - 2. One valve box key for every 12 lock lid valve boxes used in this installation.
  - 3. One 5-foot tee wrench for operating gate valves 3-inches or larger (if used).
  - 4. Six quick coupler keys and matching hose swivels for each size and type of quick coupling valve.
  - 5. Three 30-inch sprinkler keys for manual operation of control valves.
  - 6. Two sprinklers (with complete set of nozzles) for each used in the installation.
  - 7. Two wrenches for disassembly and assembly, or adjustment, or removal of each type sprinkler head and valve used in this installation.
  - 8. One Oakfield Type B soil probe.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Specified Manufacturers: As indicated on the Drawings.
- B. Acceptable manufacturers: Equivalent products of other manufacturers will be considered in accordance with the substitution provision specified in Section 01 60 00 – Product Requirements.

#### 2.02 MATERIALS

- A. Materials, General: Use only new materials of the manufacturer, size and type shown on the Contract Drawings.

- B. Plastic Pipe and Fittings: Solvent weld type, virgin polyvinyl chloride compound manufactured in accordance with ASTM D 2241 or ASTM D 1784, Class 12454-B. Joint materials shall comply with requirements of ASTM D 2672.
- C. Copper Pipe and Fittings:
  - 1. Pipe: Type K, hard tempered.
  - 2. Fittings: Wrought copper, solder joint type.
  - 3. Joints shall be soldered with silver solder, 45 percent silver, 15 percent copper, 16 percent zinc, and 24 percent cadmium. Solid at 1125 degrees F and liquid at 1145 degrees F.
- D. Brass Pipe and Fittings:
  - 1. Brass pipe shall be 85 percent red brass, ANSI, IPS Standard 125 pounds, Schedule 40 screwed pipe.
  - 2. Fittings shall be medium brass, screwed 125 pound class, FS WW-P-460.
- E. Conduit: Gray, UL listed and labeled, PVC, Schedule 40 electrical conduit ASTM F 512.

## 2.03 PIPING AND FITTINGS

- A. Pressure Piping:
  - 1. Point of Connections to Backflow Preventor: Provide copper or brass piping.
  - 2. Downstream of Fire Line Connection: Size 2-inch diameter up to 3-inch diameter, Class 315 solvent weld PVC in accordance with ASTM D 2241.
- B. Non-Pressure Piping:
  - 1. Downstream of Remote Control Valves: Schedule 40 solvent weld PVC conforming to ASTM D 1785.
- C. PVC Fittings: Schedule 40 for Schedule 40 (laterals piping and Schedule 80 for CL 315 (main) piping. Fittings shall be II-I NSF approved and shall conform to ASTM D 2466.
  - 1. Standard weight.
  - 2. Injection molded of an improved virgin PVC fitting compound.
  - 3. Slip Fittings: Deep socket bracketed type.
  - 4. Threads (where required): Injection molded type.
  - 5. Tees and Ells: Side-gated.
  - 6. Threaded Nipples: Standard weight, ASTM D 1785 Schedule 80 with molded threads.
  - 7. Provide identification markings consisting of manufacturer's name or trademark, material designation, size, applicable IPS schedule and NSF seal of approval.
- D. Sleeves: ASTM D 1785 Schedule 40 PVC.
- E. Identification:
  - 1. Identify all pipe and fittings with the following indelible and continuous markings:
    - a. Manufacturer's Name.
    - b. Nominal pipe size.
    - c. Schedule or class.
    - d. Pressure rating, in psi.
    - e. NSF Seal of Approval.



f. Date of extrusion

2. Electric Control Valve Tags: Yellow in background with black letters 2-3/4 inches by 2-1/4 inches. Attach identification tag showing valve number on each solenoid pigtail.

#### 2.04 JOINT CEMENT AND PRIMER

A. Pressure and non-pressure plastic pipe and fittings shall be coated as follows:

1. Solvent cementing of plastic pipe and fittings shall be a two-step process, using primer and solvent cement applied per the manufacturer's recommendations.
2. Cement shall be of a fluid consistency, not gel-like or ropy.
3. Solvent cementing shall be in conformance with ASTM D 2564 and ASTM D 2855.

B. When connection is plastic to metal, female adapters shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be non-lead base Teflon paste, tape, or equal.

#### 2.05 VALVES

A. Ball Valves: Provide size, type, and manufacturer indicated on Contract Drawings.

1. Conform to AWWA standards.
2. Provide bronze body, stainless steel ball and stem. Ball valves shall have threaded connections.
3. Minimum working pressures shall be not less than 150 psi.

B. Quick Coupler Valves:

1. Quick coupler valves shall be of the manufacturer, size, and type indicated on the drawings.
2. Quick coupler valves shall be brass with a wall thickness guaranteed to withstand normal working pressure of 150 psi without leakage. Valves shall have 1-inch female threads opening at base, with two-piece body. Valves to be operated only with a coupler key, designed for that purpose. When coupler key is inserted into valve a positive, watertight connection shall be made between the coupler key and valve.

C. Swing Check Valves 2-inches and Smaller: 200 pound WOG bronze construction with replaceable composition, neoprene, or rubber disc, conforming to FS WW-V-51D, Class A, Type IV.

D. Anti-Drain Valves: Provide manufacturer, size, and type indicated on the contract drawings.

1. Heavy Duty virgin PVC construction with FIP thread inlet and outlet.
2. Internal parts shall be stainless steel and neoprene.
3. Field adjustable against drawout from 5 to 40 feet of head, factory set at 12 feet.
4. Provide 18-8 stainless steel springs and valve stems with Buna-N seals.
5. Threaded connections shall be the size of the riser or pipe they are to be installed onto, or the next available size. No slip connection anti-drain valves are allowed.

E. Remote Control Valves: Electrically-operated and of the manufacturer, size, and type indicated on the drawings.

1. Valve Type: Spring-loaded, self-cleaning, packless diaphragm activated, normally closed type, equipped with flow control.
2. Valve Body: Brass or plastic as indicated on Contract Drawings.
3. Valve Solenoid: 24-volt AC 4.5-watt maximum surge, corrosion-proof, stainless steel construction, epoxy encapsulated to form a single integral unit.
4. Provide manual bleeder valve to permit operation in the field without power at the controller.

F. Valve Boxes:

1. Non-Traffic Type: Green weather-resistant plastic material resistant to sunlight and chemical action of soils. Provide box with locking cover.
  - a. Remote Control Valve Boxes: Automatic control valve and ball valve boxes shall be 16"x11"x12" 'nominal' rectangular size. Valve box covers shall be marked "RCV" with the valve identification number, or "BV" "heat branded" onto the cover in 2-inch high letters/numbers.
  - b. Drip Remote Control Valve Boxes: 17-inches by 24-inches by 12-inches.
  - c. Valve Boxes: Provide round green plastic valve box with locking lid marked WATER for all ball valves. Brand the symbol BV in 2-inch high letters ball valves.
  - d. Quick Coupling Valve Boxes: Provide locking lid for quick coupling valves. Brand QCB in 2-inch high letters.
  - e. Valve box extensions: By the same manufacturer as the valve box.
2. Traffic Type: The cover and box shall be capable of sustaining a load of 1,500 pounds. No valve boxes shall be allowed in paved areas.

2.06 IRRIGATION HEADS

A. Sprinkler Heads:

1. All ½" inlet pop-up heads shall be Hunter MP Rotator sprinklers with MPR40 4" pop-up body. The body shall have a built-in pressure regulator, reducing the pressure at the nozzle to 40 PSI. The sprinkler shall have a 4" pop-up height. It shall utilize the MP1000, MP2000 and MP side strips as indicated on irrigation plan. All MP Rotators utilize a rotating finger spray pattern that is adjustable for arc and provides matched precipitation at very low rates of application.
2. All ¾" inlet gear drive rotors shall be Hunter I-20 Ultra Stainless Steel Riser 4" Pop-Up Sprinklers, either adjustable arc or full circle as noted on drawings. They shall be nozzled to provide for full coverage.
3. All 1" inlet gear drive rotors shall be Hunter I-35 Stainless Steel Riser 6" Pop-Up Sprinklers capable of either adjustable arc or full circle operation, or approved equal.

B. Irrigation heads shall be used as indicated on the drawings.

C. Sprinkler Head Swing Joints:

1. All ½" inlet sprinklers will be supplied with a ½" x 6" mipt x mipt swing joint, like Hunter SJ-506 or approved equal.
2. All ¾" inlet gear drive sprinklers will be supplied with a ¾" x 4" mipt x mipt Sch40 Triple Swing Joint manufactured by Dura or approved equal.
3. All 1" inlet gear drive sprinklers will be supplied with a 1" x 6" mipt x mipt Sch40 Triple Swing Joint manufactured by Dura or approved equal.

2.07 AUTOMATIC CONTROLLER

- A. Hunter Acc-3000 30 station, or approved equal. This consists of an ACC-120012 station base unit with plastic cabinet and three (3) ACM-600 6 station modules. It shall be capable of real-time flow monitoring. Compatible flow sensors shall be located at each Point of Connection (P.O.C.) to monitor real time flow to track water use. The controller shall have 6 fully independent and 4 custom programs. It shall be remote control ready.

2.08 REMOTE CONTROL VALVES

- A. The remote control valves will be of the globe/angle type. It shall be a normally closed 24 volt a.c. solenoid actuated diaphragm valve. The valve and body shall be constructed of PVC. Diaphragm assembly shall be made with stainless steel, plastic and synthetic rubber. It shall have a flow control adjustment for regulating or shutting off the flow of water and a bleed screw for manual operation without electrically energizing the solenoid coil. The valve construction shall be such as to provide for all internal parts to be removable from the top of the valve without disturbing valve installation. The valve shall be rated at 150 PSI maximum working pressure.
1. 1" valves at a flow rate of 20 gallons per minute (GPM), will have a pressure loss not to exceed 3.1 PSI in an Angle configuration, or 3.2 PSI in a globe configuration. Such as Irritrol 100P1.5.
  2. 1.5" valves a flow rate of 50 gallons per minute (GPM), will have a pressure loss not to exceed 2.8 PSI in an Angle configuration, or 3.6 PSI in a globe configuration. Such as Irritrol 100P1.5.
  3. 2" valve at a flow rate of 100 gallons per minute (GPM), will have a pressure loss not to exceed 2.0 PSI in Angle configuration or 3.3 PSI in a Globe configuration. Such as Irritrol 100P2.
  4. 3" valve at a flow rate of 175 gallons per minute (GPM), will have a pressure loss not to exceed 2.4 PSI in Angle configuration, or 3.0 PSI in a globe configuration. Such as Irritrol 100P3.

## 2.09 SUBSURFACE IRRIGATION

- A. All areas designated as Xeroscape on the irrigation plan shall utilize a subsurface dripperline system utilizing Netafim Techline CV Dripperline, or approved equal. This product is supplied in 1000' rolls with .6GPH or .9GPH on 12", 18", or 24" spacing (depending on soil conditions).
- B. At each designated 1" Drip Control Valve, a 1" long or 1-1/2" long Netafim Techfilter shall be installed. This special filter contains Trifluralin, which is a special herbicide that inhibits root growth into the dripper outlets. The filter cartridge is designed to be replaced every two years. The filter selection will be based on the total flow requirements of the each dripperline zone (to be determined by the Contractor at the time of installation). The Techfilter screen is 140 mesh. The maximum rated flow for the 1" long filter is 22 GPM. The maximum rated flow for the 1-1/2" long filter is 40 GPM.
- C. Downstream of the Netafim Techfilter, a pressure regulator should be installed to limit downstream pressure to 45 PSI. Because Techline CV is pressure-compensating, there is no reason to intentionally reduce the pressure below 45 PSI.
- D. Downstream of the pressure regulator, the delivery pipe is Sch40 PVC and sized as noted on plan. At each planter area there is one or more Drip Point of Connections (P.O.C.).
- E. At each Drip P.O.C. the Sch40 PVC Pipe is interfaced to Netafim CV Dripperline, using a header and exhaust header as recommended by the manufacturer. At the end of each drip circuit install a flushing valve.
- F. The Contractor is responsible for selecting the proper mix of components taking into account the specific watering requirements of each drip zone.

## 2.10 ELECTRICAL

- A. Electrical Equipment: All electrical equipment shall be NEMA Type 3, waterproofed for exterior installations, complying with requirements of applicable Electrical Code and authorities having jurisdiction.
- B. High Voltage: Electrical service to automatic controller shall be in accordance with Division 26 Sections. Provide final hookup to equipment as a part of the work specified in this section.
- C. Low Voltage:

1. Control wires: Connections between controller and remote control valves shall be made with direct burial AWG-UF 600 volt wire, 12 gage or larger, insulation thickness 3/64-inch, utilizing low density high molecular weight polyethylene insulation.
  2. All wire splices shall be made with “Dri-Splice” or “King” water tight connectors or approved equal.
  3. Common ground wire connections between controller and remote control valves shall be made with direct burial AWG-UF 600 volt wire, 12 gage or larger, insulation thickness 3/64-inch, utilizing low density high molecular weight polyethylene insulation.
  4. Control wires shall be red. Where two or more controllers are used, they shall be a different color for each controller.
  5. Colors shall be noted on the Controller Charts located on controller door.
  6. Flow sensor shall be wired to the controller using Paige PE-39 shielded sensor cable consisting of two 14 gage copper wires.
  7. Sleeves for Control Wires: Under all walks and paving and where indicated on drawings, Schedule 40 PVC shall be used.
- D. Connections: Make connections between controller and remote control valve with direct burial copper wire.
1. Wire shall be No. 14 AWG Type UP 600-volt single conductor type, PVC insulated underground feeder, UL approved.
  2. Pilot wires shall be a different color for each controller. Common wires shall be white with a color stripe matching the controller pilot wire color.
- E. Wiring:
1. Bury wire a minimum of 12-inches on depth in same trench as main irrigation line. Secure to pipe with plastic electrical tape at intervals of 10 feet on center, providing slack for thermal movement.
  2. Provide a 24-inch expansion curl within 3 feet of each wire connection, change of direction, and at least every 100 feet of wire length.
  3. Splices: All splices and RCV connections shall be made using 3M DBY pre-filled wire connectors.
    - a. Locate field splices in pull boxes set 1-inch above finish grade.
    - b. Field splices between controller and remote control valve will not be permitted.

## 2.11 BACKFLOW PREVENTION UNITS

- A. The backflow prevention unit shall be of the manufacturer, size, and type indicated on the drawings.
- B. The backflow prevention unit shall be installed in accordance with the requirements set forth by local codes.
- C. The backflow enclosure shall be of the manufacturer, size, and type indicated on the drawings.

## 2.12 MISCELLANEOUS EQUIPMENT

- A. Miscellaneous Equipment: Flow meters, booster pumps, radio remote control units, rain sensors, basket strainers and master valves shall be of the manufacturer, size and type indicated on the drawings.

- B. Landscape Fabric: For valve box assemblies, DeWitt Pro 5 Weed Barrier or approved equal, 5.0-oz. weight woven polypropylene weed barrier. Landscape fabric shall have a burst strength of 225 PSI, a puncture strength of 60 lbs. and capable of water flow of 12 gallons per minute per square foot.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

##### A. Verification of Conditions:

1. Verify that grading has been complete.
2. Do not install irrigation system when field obstructions, grade differences, or discrepancies in area dimensions exist that may not have been considered in the original design.
3. Exercise care in excavating and working near existing utilities. Be responsible for existing utilities and for damages to utilities which are caused by operations or neglect. Check existing utility drawings and the drawings of other contracts for locations.
4. Identify above- and below-grade utilities. Locate and mark existing above- and below-grade utility lines.
  - a. The drawings do not purport to show all below-grade conditions and objects in the project area.
  - b. Notify serving utility companies to terminate, remove and relocate utilities as necessary.
  - c. Maintain and protect existing utilities remaining in work area.
  - d. Mark paving and install stakes and flags in unpaved locations to indicate presence and characteristics of existing utilities.
5. Information on the contract drawings relative to existing conditions is approximate. Deviations required to conform to actual conditions, as approved by the Architect in writing, shall be made without additional cost.
6. In the event of discrepancy, immediately notify the Architect or Owner's authorized representative. Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.
7. Grades:
  - a. Before starting work, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.
  - b. Final grades shall be accepted by Architect before work specified in this section begins.

##### B. Interpretation of Landscape Drawings:

1. All required offsets, fittings, and sleeves may not be indicated. Carefully investigate structural and finish conditions affecting work and plan work to furnish such fittings as may be required. Contract drawings are generally diagrammatic and indicative of the work to be installed. Due to the scale of the contract drawings, it is not possible to indicate all offsets, fittings, and sleeves that may be required to complete the irrigation system.
2. Before proceeding with irrigation system work, Contractor shall check and verify all dimensions and quantities and shall immediately inform Architect in writing of discrepancies between the contract documents (drawings and specifications) and field conditions. No work shall be performed in any area where there is such a discrepancy until written directions have been given by the Architect to resolve the discrepancy. Contractor shall assume full responsibility for work performed without such direction.

- a. The Contractor shall verify and be familiar with the locations, size and detail of points of connection provided as the source of water, electrical supply, and telephone line connection to the irrigation system.
3. All scaled dimensions are approximate. Contractor shall check and verify all site dimensions and notify Architect in writing of discrepancies.
4. Products shall be installed in such a manner as to avoid conflicts between irrigation system and planting, existing or proposed utilities, and all other construction features.
5. Verify, prior to and during construction, that the contract documents being used for construction reflect the latest revisions, change orders, and plan checks. Contractor shall be able to produce such documents at the request of the Architect at any time during construction.
6. Diagrammatic Intent: The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale where possible. Provide offsets in piping and changes in equipment locations as necessary to conform to structures and to avoid obstructions or conflicts with other work, with no change in contract time and contract sum.
7. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities which are caused by his operations or neglect.

### 3.02 PREPARATION

#### A. Protection:

1. Protect previously installed work and materials which may be affected by work specified in this section.
2. Protect existing utilities and features to remain on and adjacent to the project site during construction. Repair damage resulting from landscape operations or negligence.

#### B. Layout:

1. Prior to installation, stake out pressure supply lines, routing and location of sprinkler heads, valves, backflow preventer devices, and automatic controllers.
  - a. Layout each system using staking method acceptable to Architect.
  - b. Maintain and protect staking layout.
  - c. Piping or equipment shown diagrammatically on drawings outside of planting areas shall be installed inside planting areas whenever possible.
2. Layout irrigation system and make minor adjustments required due to differences between actual site and contract drawings. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.
3. Water Supply: Connections to, or the installation of, the water supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made with no change in contract time and contract sum.
4. Layout shall be approved by the Architect in writing prior to installation. If equipment is incorrectly located without this approval, Contractor shall relocate equipment as directed by Architect, with no change in contract time or contract sum.

#### C. Electrical Service: Electrical power sources shall be as indicated on the drawings. Comply with requirements specified in Division 26 – Electrical, for making connections. In addition to requirements specified below, comply with requirements specified in Section 02 30 00 – Earthwork.

1. Connections to the electrical supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made with no change in contract time or contract sum.
2. Make 120 volt connection to irrigation controllers.

### 3.03 TRENCHING

- A. Trenching, General: Excavations shall be straight with vertical sides, even grade, and support pipe continuously on bottom of trench. Trenching excavation shall follow layout indicated on drawings to the depths below finished grade and as noted. Where lines occur under paved area, these dimensions shall be considered below subgrade.
- B. Prior to trenching into the soil, locate all cables, conduits, sewer septic tanks, and other utilities. Take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, Contractor shall promptly notify Architect and Owner to arrange for relocations. Contractor will proceed in the same manner if rock layer or similar conditions are encountered.
- C. Provide minimum coverage as follows:
  - 1. Pressure Supply Lines:
    - a. Under planting areas: 24-inches.
    - b. Under Paved Areas: 36-inches.
  - 2. Non-pressure Lines: 12-inches.
  - 3. Control Wire: 12-inches.
- D. Provide not less than 4-inches clearance between each line and not less than 12-inches clearance between lines of other systems, unless otherwise indicated on contract drawings. Do not install parallel lines directly over any other line.
- E. Protect materials to prevent intrusion of dirt and moisture. Flooding of trenches shall be permitted only with the approval of the Architect.
- F. Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots.
  - 1. Excavation in areas where 2-inch and larger roots occur shall be done by hand. All roots 2-inches in diameter, except directly in the path of a pipe conduit, shall be tunneled under and shall be heavily wrapped with burlap to prevent scarring or excessive drying.
  - 2. Where a ditching machine is run close to trees having roots smaller than 2-inches in diameter, the wall of the trench adjacent to the tree shall be hand-trimmed, making clean cuts through.
  - 3. Roots 1-inch and larger in diameter shall be painted with two coats of Tree Seal, or equal.
  - 4. Trenches adjacent to trees should be closed within 24 hours, and where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.
  - 5. In case of damage to existing trees, the Contractor shall forfeit an amount in proportion to extent of damage determined by the Owner, which amount shall not exceed \$10,000 per tree total loss.

### 3.04 BACKFILLING

- A. Backfilling, General: In addition to requirements specified below, comply with requirements specified in Section 31 23 33 – Trenching and Backfilling.
- B. Backfill Material: Backfill material on all lines shall be the same as adjacent soil, free of debris, litter, and rocks over 1/2 -inch in diameter.
  - 1. Existing site material, if approved by the Architect, shall be used for backfill material. Backfill material shall be free from organic materials, large clods of earth or rocks larger than 1-inch in

- diameter, trash, debris, rubbish, broken cement, asphalt material or other objectionable substances.
2. Imported backfill material, if required, shall be clean soil consisting of earth, sand, sandy clay, loam or other approved materials, with no large clods of earth or rocks larger than 1-inch diameter.
  3. Sand backfill shall be fine, granular, unwashed river sand material containing no foreign matter larger than ½-inch in size.
  4. Where excavated native soil contains greater than 50 percent rock or other material 1-inch diameter or larger, sand backfill shall be placed 3-inches in depth around pipes.
- C. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, Contractor will make all the required adjustments without cost to the Owner.
- D. Backfill shall be tamped in 4-inch layers under the pipe and uniformly on both sides for the full width of the trench and the full length of the pipe. Backfill materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to a dry density equal to adjacent undisturbed soil and shall conform to adjacent grades.
1. Compact backfill with mechanical devices to a dry density equal to adjacent undisturbed soil. Restore to adjacent grade, free of dips, depressions, humps, or other irregularities.
  2. Compaction by truck or other vehicle shall not be permitted.
  3. Flooding in lieu of tamping is not allowed.
- E. Cover at Paved Areas: Provide sand backfill a minimum of 6-inches over and under all piping under paved areas.
1. Backfill with sand, one layer 6-inches below pipe and one layer 6-inches above pipe, and compact in layers to 90 percent compaction using mechanical tamping devices. Set in place, cap, and pressure test piping under paving prior to installation of paving work.
  2. Install piping under existing walks by jacking, boring, or hydraulic driving. Cutting or breaking of sidewalks or concrete is not allowed without Architect's approval. No hydraulic driving will be permitted under concrete paving.
  3. Provide for a minimum cover of 36-inches between top of pipe and bottom of paving for pressure and non-pressure piping installed under asphaltic or cement concrete paving.

### 3.05 INSTALLATION

- A. Carefully inspect all pipe and fittings before installation, removing dirt, scale, burrs and reaming. Install pipe with all markings up for visual inspection and verification.
1. Remove all dented and damaged pipe sections.
- B. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. No hydraulic driving is permitted under asphalt pavement.
1. Sleeving: Install irrigation and electrical sleeving as indicated on the contract drawings. Contractor shall coordinate the installation of sleeves with the work of other trades to ensure installation of underground work precedes paving installation.
- C. In solvent welding, use only the specified primer and solvent cement and make all joints in strict accordance with the manufacturer's recommended methods including wiping all excess solvent from each weld. Allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling.



D. Connections:

1. All threaded plastic-to-plastic connections shall be assembled using Teflon tape.
2. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope on all threaded plastic-to-metal connections, except where noted otherwise. All plastic-to-metal connections shall be made with plastic male adapters.
3. Brass pipe and Fittings: Assemble using Teflon tape applied to male threads only.

E. Plastic Pipe and Threaded Fittings: Install in accordance with manufacturer's instructions.

1. Pipes shall be clean and free from moisture and assembled using specified primer and solvent to all plastic-to-plastic joints.
2. Pipe shall be snaked within the trench as much as possible to allow for expansion and contraction.
3. Assemble plastic pipe and threaded fittings and plastic pipe to metal joints using Teflon tape applied to male threads only. Use only lightweight wrench pressure to tighten.
4. Routing of irrigation pipe as indicated on the Contract Drawings if diagrammatic. Install lines and various assemblies to conform to the details shown on the contract drawings.
5. Install no multiple assemblies on plastic lines. Provide each assembly with its own outlet.
6. Install assemblies specified in accordance with respective detail. In absence of drawing details or specifications pertaining to specific items required to complete the work, perform such work in accordance with best usual and customary practice for comparable projects, subject to prior review and written approval of the Architect.
7. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be solvent welded.
8. In changing pipe depth, 45-degree elbows shall be used.
9. Assemble all bell and gasket connections and fittings as recommended by the pipe and fitting manufacturers.
10. Joint restraints shall be used on all bell and gasket fittings located at or within 50 feet of a direction change. Joint restraints shall be used on all gate valves.

F. Swing Joints: Provide swing joint assemblies manufactured in accordance with contract drawings.

G. Programming: Irrigation system shall be programmed to operate during the periods of minimal use of the design area or in accordance with the irrigation schedule provided.

H. Sprinkler Heads:

1. Shrub heads shall be installed as indicated on drawings.
2. Install heads along curbs, walks, and paving level with grade in lawn areas.
3. Lower raised heads within 10 days after notification by the Owner.
4. Set all heads perpendicular to finished grade, unless otherwise directed by Architect.
5. Spacing of sprinklers shall not exceed the maximum indicated on the contract drawings.
6. Riser units shall be manufactured in accordance with the irrigation details.
7. Riser nipples for all sprinklers shall be the same size as the riser opening in the sprinkler body.

I. Remote Control Valves:

1. Install where shown on contract drawings. When grouped together, allow at least 12-inches between valve boxes and from landscape items.
2. Install each control valve in a separate valve box.
  - a. Valve boxes shall be installed in shrub areas whenever possible.
  - b. Each valve box shall be installed on a foundation of ¾-inch gravel backfill, 3 cubic feet minimum. Valve boxes shall be installed with their tops ½-inch above the surface of

- surrounding finish grade in lawn areas and 3-inches above finish grade in ground cover areas.
- c. Provide air space between gravel and remote control valve.
3. Install in accordance with the irrigation details and manufacturer's recommendations.
  4. For remote control valves, provide 24-inch expansion loop at all electrical connections within control valve boxes.
  5. Quick Coupling Valves: Unless otherwise indicated, locate valves within 12-inches of nearest edge of hardscape. Install one valve per valve box. Install in shrub area where possible.
  6. Valve shall be installed in shrub areas whenever possible.
  7. Install all valves as indicated in the detail drawings.
  8. Valves to be installed in valve boxes shall be installed one valve per box.
  9. Quick coupler valves shall be set approximately 12-inches from walks, curbs, header boards, or paved areas where applicable.
- J. Automatic Air Release Valve: Air release valves shall be installed at high points in accordance with the manufacturer's recommendations. Locations shall be subject to review and approval of Architect.
- K. Irrigation Controller:
1. The Contractor shall be responsible for connecting 115 volt single phase power to the irrigation controller. The 115 volt power source will be supplied by others. The irrigation controller(s) will be located as indicated on the design. The exact location will be determined by the Architect at the time of installation.
  2. Securely mount controller(s as directed by manufacturer. Refer to manufacturer's recommendations for proper interface with controller and electric control valves. It is designer's intent that all irrigation control wires that are above ground be encased in Schedule 40 PVC electrical conduit (with sunlight resistant properties). This refers specifically to the area between the irrigation controller and the ground.
  3. Complete all electrical connections to controller.
  4. Install Flow-Click sensors at each point of connection (P.O.C.). There are a total of five (5), one 4" and four 3". Follow manufacturer's directions and route sensor cable back to controller.
- L. Sprinkler Heads:
1. Install all sprinklers 2" from curbs, walks, slabs and buildings as detailed in drawings. Refer to Hunter Industries published installation recommendations for MP Rotator and rotor type sprinklers.
  2. Use Teflon tape on all threaded fittings. The use of pipe joint compound voids manufacturer's warranty.

### 3.06 UTILITY CONNECTIONS

- A. Make final electrical hook up to irrigation controller CCU in compliance with requirements specified in Division 26 – Electrical.
- B. Connect to existing point of connection at locations indicated on drawings and make minor changes in location necessary due to actual site conditions as work specified in this section. Adapt to existing pipe using new couplers, and reducers.
- C. Connect to existing electrical service using necessary materials and connections as shown on the contract drawings. Make minor changes in location as necessary due to actual site conditions as work specified in this section. Electrical work shall conform to applicable Electrical Code and requirements of authorities having jurisdiction. 120-volt power connection to controller shall be provided by the Contractor.

### 3.07 UTILITY CONNECTIONS

- A. Place wiring in the same trench and along the same routing as the pressure supply lines, unless otherwise indicated.
  - 1. Install wiring prior to main line whenever possible.
  - 2. When more than one wire is placed in a trench, tape wires together at a maximum 10 feet on centers, and lay to one side of trench.
  - 3. Lay control wire loosely in trench without stretching control wire conductors.
- B. All connections shall be of an approved type and shall occur in a valve box. Provide a 24-inch service loop at each connection.
- C. A continuous run of wire shall be used between a controller and each remote control valve. Under no circumstances shall splices be used without prior approval.
- D. Provide 24-inch expansion loop at each connection and directional change, and 24-inch expansion loop at each remote control valve. Provide sufficient length at each splice to allow valve bonnet to be brought to the surface without disconnection.
- E. Run two spare No. 14 gage wires from controller along entirety of main line to last electric control valve each and every leg of main line. Label spare wires at both ends.
- F. Under no circumstances shall splices be used without prior approval.
  - 1. If wires under paved areas cannot be continuous, splices shall be enclosed in a specified junction box. All splices and RCV connections shall be made using Rainbird pentite connectors, or equal dry-splice method.
- G. Low Voltage:
  - 1. Pull boxes for the low voltage control wires shall be provided at a spacing of 480 feet on center along the wire route. An expansion loop of 24-inches shall be provided at each control wire pull box.

### 3.08 FIELD QUALITY CONTROL

- A. Contractor's Responsibility:
  - 1. Notify the Architect for the following reviews, with 48 hours minimum notice.
    - a. System layout.
    - b. Pressure supply line installation and testing.
    - c. Coverage tests prior to landscape planting.
    - d. Automatic controller and backflow preventer installation.
    - e. Automatic air release valve installation.
    - f. Control wire installation.
    - g. Lateral line and sprinkler head installation.
  - 2. Provide 7 days notice for final review.
  - 3. Provide walkie-talkie equipment and personnel to maintain communication from review area to automatic controllers.
  - 4. Provide up-to-date project record drawings at each review.

- a. In the event Contractor calls for a review without up-to-date project record drawings, or without preparing the system for inspection, Contractor shall be responsible for reimbursing the Architect on any hourly basis for the inconvenience.
  - b. No further review will be sheduled until this charge has been paid.
- B. Test all systems prior to backfilling. If the only piping installed is over 20 feet long, pressure testing is required for that section at the time of installation. Upon completion of piping installation, the entire system shall be tested.
  1. Center load all plastic pipe prior to pressure testing.
- C. Do not allow or cause any of the work specified in this section to be covered up or enclosed until it has been observed, tested and accepted by the Architect, Owner, and governing agencies.
- D. Contractor shall notify Architect, Owner, and authorities having jurisdiction, minimum of 48 hours in advance, where and when the work is ready for inspection and testing.
- E. When the sprinkler system is completed, Contractor shall perform coverage test of each system in its entirety to demonstrate that water coverage for planted areas is complete and adequate. Test will be observed by Architect. Contractor shall adjust water coverage as directed by Architect until acceptable coverage is obtained. No planting shall be started until acceptable water coverage is obtained and written acceptance is provided by Architect.
- F. If sprinkler system installation deviates from the drawings with approval of Architect, Contractor shall reconstruct sprinkler system to correct deficiencies in water coverage without change in contract time and contract sum.
- G. Final observation review will not commence until updated project record drawings have been prepared and are available during final observation review.
- H. Contractor shall make provisions for Architect and Owner's authorized representative to visit and observe the work at all times and shall provide safe access for such visits.
- I. Where the specifications require work to be inspected or tested, work shall not be covered over until reviewed and accepted by the Architect, Owner's authorized representative and, if required, authorities having jurisdiction. Contractor shall notify Architect, Owner and, if applicable, authorities having jurisdiction, minimum of 48 hours in advance, indicating where and when work will be ready for inspection and testing. Should work be covered without inspection or testing, work shall be uncovered, if so directed, at no change in contract time and contract sum.
- J. Site Observation Visits:
  1. Site observation visits will be required for the following at a minimum:
    - a. System layout.
    - b. Pressure test of irrigation main line (four hours at 125 PSI or 120 percent of static water pressure, whichever is greater, with no pressure loss).
    - c. Coverage test of irrigation system.
    - d. Final site observation prior to start of maintenance period.
    - e. Final acceptance.
  2. Site observations and testing will not commence without up-to-date project record drawings being available. Project record drawings shall be complete and up-to-date for each site visit.

- K. Water analysis testing facility shall be Wallace Laboratories, El Segundo, CA (310) 614-6863. Costs of water quality tests shall be included in contract sum.
- L. Pressure Tests:
1. Do not install remote control valves, quick couplers, or any other valve assembly until testing of pressure main lines is completed and approved.
  2. Do not backfill trenches more than necessary until testing has been reviewed, tested, and accepted.
  3. Provide equipment necessary to test systems, including force pump.
  4. Perform hydrostatic tests in presence of the Architect. No pipe shall be backfilled until it has been observed, tested, and approved in writing by the Architect. Should any work be covered up before such observation and tests are completed, the Contractor shall, at Contractor's expense, uncover the work. After work has been observed, tested and approved, Contractor shall then make repairs with such materials as required to restore all work disturbed to original and proper condition.
  5. Test pressure supply lines under hydrostatic pressure of 150 pounds per square inch for a period of not less than 2 hours, unless otherwise directed by Architect in writing. Place three pressure gauges, equally spaced, along mainline for review. All necessary pump equipment shall be present on site during the test.
- M. System Flushing: After sprinkler pipe lines and risers are in place and connected, and prior to installation of sprinkler heads, thoroughly flush all lines with a full head of water. Install sprinkler heads after lines have been flushed and are determined to be acceptable by Architect.
1. Prior to installation of sprinkler nozzles, the valves shall be opened and a full head of water used to flush out the lines and risers.
  2. Sprinkler nozzles shall be installed after flushing the system has been completed.
- N. Coverage Tests:
1. Perform coverage tests after sprinkler system is completed, but prior to any planting, in the presence of the Architect.
  2. Test system to ensure that planting areas are watered adequately and uniformly.
  3. Make necessary adjustments, including realignment of heads, to provide required coverage as directed by the Architect.
  4. If it is determined that coverage can be improved by a nozzle change, make such changes, or arrange with the manufacturer to have such changes made, as part of the work specified in this section. Make changes prior to any planting.
  5. Contractor shall operate each system in its entirety at time of final observation by Architect. Items determined not to be acceptable shall be reconstructed at no change in contract time or contract sum, as directed by the Architect.
- O. Work which fails testing and is not accepted will be retested. Hourly rates and expenses of the Architect, Owner's authorized representative and, if applicable, authorities having jurisdiction, for reinspection or retesting, will be paid by the Contractor.

### 3.09 ADJUSTING

- A. Adjustment of the System:
1. Contractor shall adjust pressure regulating devices on the remote control valves as directed by the Architect.
  2. Contractor shall adjust and flush sprinklers for optimum performance and to prevent overspray onto walks, windows, roadways, and buildings as much as possible.
  3. If it is determined that adjustments in the irrigation system are necessary for proper and more adequate coverage, Contractor shall make such adjustments as directed by Architect.

Adjustments shall include changes and additions of sprinklers, nozzle size and degrees of arc as required without additional contract costs.

4. If it is determined that any irrigation component is improperly installed, then adjustments shall be made to conform to contract documents without change in contract time or contract sum.
  5. Sprinklers shall be set perpendicular to finished grades unless otherwise indicated on the contract drawings.
- B. Owner reserves the right to make temporary repairs as necessary to keep the irrigation system in operating condition. The exercise of this right shall not relieve the Contractor of his responsibilities under the terms of the guarantee as herein specified.
- C. Contractor shall adjust valves, align heads, and check coverage of each system prior to coverage test.
- D. If it is determined by the Architect or Owner's authorized representative that additional adjustments or nozzle changes will be required to provide proper coverage, all necessary changes or adjustments shall be made prior to any planting.
- E. The entire system shall be operating properly before any planting operations commence.
- F. Automatic control valves are to be adjusted so that the sprinkler heads operate at the pressure indicated on the contract drawings.

### 3.10 CLEANING

- A. Upon completion of the work, restore ground surfaces to required elevations and remove excess materials, debris, and equipment from the site.
- B. Clean-up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed, and any damage sustained on the work of others shall be repaired to original conditions.
- C. Dispose of waste, trash, and debris in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Bury no such waste material and debris on the site. Burning of trash and debris will not be permitted. The Contractor shall remove and dispose of rubbish and debris generated by his work and workmen at frequent intervals or when ordered to do so by the Owner's authorized representative.
- D. At the time of completion the entire site will be cleared of tools, equipment, rubbish and debris which shall be disposed of off-site in a legal disposal area.

END OF SECTION 32 84 00

SECTION 32 91 00 PLANTING PREPARATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Planting Preparation, as indicated on the drawings, specified herein, or reasonably required to complete the work.
  - 1. Preparation of soil for planting, including weeding, cross ripping and finish grading, at lawn and planting areas.
  - 2. Landscape edgings.
  - 3. Root Barrier.
- C. Related Sections:
  - 1. Section 32 93 00 Landscape Planting: requirements for soil for trees, plants and ground cover.

1.02 SUBMITTALS

- A. Project Record Drawings: Accurately record location of all underground utilities.

1.03 PROTECTION

- A. Protection: Protect existing features, including existing structures, fences, paving, drainage ways and plant materials. Stake and mark the location of existing utilities before commencing grading Work.

1.04 DEFINITIONS

- A. Finish Grading: Finish grading shall consist of finishing surfaces by raking smoothly and evenly to facilitate natural run-off water, and by removing and disposing of extraneous matter.
- B. Subgrade: The surfaces upon which additional specified materials are to be placed, prepared, or constructed.
- C. Rough Grade: The establishment of grades to required tolerances.
- D. Finish Grade: Spot elevations (grades) are indicated based on the best available data. Contract Hardscape Drawings are referenced to provide additional site grading information. It is intended that constant slopes are maintained between spot elevations.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Imported Topsoil:
  - 1. Provide natural, fertile, friable soil free from stones, noxious weeds, seeds, roots, subsoil or other material detrimental to normal plant growth. Topsoil acidity range (pH) shall be

between 6.5 to 7.5 containing a minimum of 4 percent and a maximum of 25 percent organic matter.

2. Obtain imported topsoil from local sources acceptable to the Architect.
3. Silt plus clay content of soil shall not exceed 15 percent by weight with a minimum 95 percent passing a 2-millimeter sieve.
4. Submit samples of import soil to the soils testing laboratory for analysis, interpretation, and recommendation prior to on-site delivery.

B. Soil Conditioner:

1. Commercial fertilizer, uniform in composition, free-flowing, suitable for application with specified equipment, and fertilizer laws, and bearing the name of mark of the manufacturer. Gro-Power Plus, or equal, and shall consist of the following ingredients by weight:

Nitrogen 5 percent  
Phosphoric acid 3 percent  
Potash 1 percent  
Humus 50 percent  
Humic acids 15 percent

C. Fertilizers:

1. Planting Pit Fertilizers: Gro-Power Plus (bacteria included) with soil penetrate and consisting of the following ingredients by weight:

Nitrogen 5 percent  
Phosphoric acid 3 percent  
Potash 1 percent  
Humus 50 percent  
Humic acids 15 percent

2. Planting Tablets: Slow-release 21-gram tablets as manufactured by Gro-power, or equal, and containing the following ingredients by weight:

Nitrogen 20 percent  
Phosphoric acid 10 percent  
Potash 5 percent  
Humus 10 percent  
Humic acids 2 percent

D. Organic Soil Amendment: Aguinada GPS2, produced by Aguinada Fertilizer Co., Inc., Irvine CA (714/786-9558) or approved equal, special blend consisting of:

1. General Purpose mulch:

- a. Nitrogen: Less than 1 percent (stable) will not create nitrogen drag.
- b. Phosphorus: Provides adequate levels.
- c. Practical size: Fine texture, 0-1/2 inch.
- d. pH: 6.9 to 6.4; 6.65 average.
- e. E.C.E.: 1.8 to 3.6; 2.7 average.

2. Recycled green-matter:



- a. Nitrogen: Approximately 1.5 percent (stable), with no nitrogen drag.
- b. Phosphorus: Adequate for planting.
- c. Potassium: High to optimum levels, not requiring additional potassium supplement 90 days after planting.
- d. Mix: Nitrolized and stabilized.
- e. Composting: Fully.

E. Accessory Materials:

1. Pre-Planting Herbicide: Round-Up, or equal.
2. Pre-Emergent Weed Control: Ronstar-G, Treflan, Eptam, Vegitex, or equal.
3. Peat Moss: Sphagnum peat moss, Canadian or European variety, free from alkali.
4. Soil Sulfur: First quality commercial grade.
5. Ferrous Iron Sulfate: First quality commercial grade.
6. Agricultural Gypsum: First quality commercial grade.
7. Calcium Carbonate Lime: First quality commercial grade.
8. Root Hormone: Super Thrive.

F. Root Barrier :DEEPROOT 24" UNIVERSAL GUIDE – UB 24-2

1. Panel Diminsions: 24" H x 24" W
2. Material: Copolymer Polyproylene of 0.085" thickness

2.02 MIXES

- A. Mix Requirements: The following mixes are intended for Bid purposes only. Actual requirements shall be determined after final analysis of soil.
- B. On-grade Backfill Mix for General Use: Blend the following ingredients per cubic yard:
  1. 0-0-50 Potassium Sulfate: 1/4-pound
  2. 0-20-0 Single Superphosphate: 1/5-pound
  3. 21-0-0 Ammonium Sulfate: 1/4-pound
  4. Agricultural Gypsum: 1.5 pounds
  5. Good Humus: 15 percent by volume

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Identification of Above- and Below-grade Utilities. Identify utilities in and adjacent to Project area.
  1. Identify above- and below-grade utilities. Locate and mark existing above- and below-grade utility lines.
  2. Should utilities and other below-grade conditions be encountered which adversely affect the Work, discontinue affected Work and notify District Representative and Architect, requesting

direction. Unforeseen conditions will be resolved in accordance with provisions of the Conditions of the Contract.

- B. Agronomic Soils Testing: Performed by testing laboratory selected and paid by District.
1. Site Soil: Take samples of site soil, at a depth of 6- to 12-inches (75 mm to 150 mm), within proposed planting areas, after completion of grading and prior to weed control and soil preparation.
    - a. There shall be four sampling areas located throughout the site as selected by the Architect.
    - b. Take two core samples at each sampling area.
    - c. Suitability and fertility analyses with comments and recommendation will be provided for each sample.
    - d. Testing laboratory's interpretation, recommendations, and comments will be submitted to District Representative and Architect within 14 days after the completion of rough grading.
  2. Testing:
    - a. Testing will be performed for fertility and suitability analysis, with written recommendations for soil amendment, fertilizer and chemical conditioners, application rates for soil preparation, planting backfill mix, hydrospray, and post-maintenance fertilization programs.
    - b. Agronomic soils analysis and report recommendations shall take precedence over the amendment and fertilizer application rates specified in this Section.
    - c. On receipt of a soils analysis and recommendations, a Change Order will be issued if revision to soil treatment is required which results in change in Contract Sum or Contract time.
    - d. At District's option, additional soil testing will be conducted for organic suitability after completion soil preparation in planting areas.

### 3.02 PLANTING AREAS PREPARATION, GENERAL

- A. Clearing of Planting Areas: Before soil amendment Work commences, clear all planting areas of existing vegetation not otherwise removed under site clearing Work. See Section 02230 – Site Clearing. Landscape grading and soil preparation shall be performed after Work specified in other Sections has been completed in planting areas, except irrigation system installation.
1. Clear and clean soil of roots, plants, grasses, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth and unsightly in appearance.
  2. Remove soil contaminated by construction activities, which might be detrimental to healthy growth and appearance of landscaping.
- B. Grading: Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- C. Scarifying: Scarify subgrade to depth of 4-6 inches where soil amending will be performed. Scarify in areas where equipment has been used for hauling and spreading soil amendments and have compacted subsoil.
- D. Pre-Planting Weed Abatement:
1. Protect from damage all existing plants to remain.

2. Manually remove all existing vegetation and dispose off-site.
  3. Fertilize all planting areas with urea 35-0-0 commercial fertilizer, applied at rate of one-half pound per 1000 square feet.
  4. Water all planting areas thoroughly and continuously for a period of two to three consecutive weeks or until the weed seeds have germinated.
  5. When there is sufficient weed seed germination, apply a post-emergent contact weed killer according to directions of the manufacturer.
  6. Allow sufficient period of time to ensure that all weeds are dead. Follow herbicide manufacturer's directions.
  7. Water all planting areas thoroughly and continuously for a period of three consecutive weeks. A shorter watering period may be permissible at the discretion of District Representative after consultation with Architect (Landscape Architect) or District's pest control advisor (if applicable). Discontinue watering process for one day prior to second application of herbicide spraying. Reapply the spraying operation with a straight contact weed killer according to pest control advisor's recommendations. Allow minimum of 4 days without irrigation for effective final weed kill.
  8. Clear all desiccated weeds from the slope to the finished grade, remove from site and dispose of in a legal manner.
  9. District Representative after consultation with Architect (Landscape Architect) may shorten or eliminate weed abatement period if deemed necessary.
- E. Finish Grading: Finish grading to 0.10 foot shall be attained prior to beginning landscape planting operations and final finish grading in planting areas shall comply with the following:
1. Make minor modifications to grade as may be necessary to establish required final grade. Accommodate mixing of soil amendments and fertilizers into soil. Allow for settling of soil in planting areas.
  2. Shape planting areas as indicated on Drawings or as necessary for proper planting and drainage. Ensure that finish grade provides proper drainage of the site and surface drainage is away from structures.
  3. Final grades shall be 3-inches below adjacent paving, valve boxes, headers, clean-outs, drains, manholes, and other features adjacent to and within planting areas.
  4. Eliminate erosion scars prior to commencing landscaping maintenance period.
- F. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off District property.
1. Apply fertilizer as directed, directly to subgrade before loosening.
  2. Apply soil amendments and fertilizer on surface and thoroughly blend into soil.
    - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    - b. Mix lime with dry soil before mixing fertilizer.

3. Blend soil amendments and fertilizer to depth of 4-inches (100 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is muddy or excessively wet.
- G. Unchanged Subgrades: Prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  2. Loosen surface soil to a depth of at least 8 inches (200 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
    - a. Apply fertilizer directly to surface soil before loosening.
  3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
  4. Legally dispose of waste material, including grass, vegetation, and turf off District property.
- H. Soil Preparation:
1. Cross-rip on-grade planting areas to a depth of 6 inches (300 mm) in two perpendicular directions.
  2. Condition soil with organic amendment in accordance with the following application rates per cubic yard:
    - a. Potassium sulfate 0-0-50, 1/4-pound
    - b. Single Superphosphate 0-20-0, 1/4-pound
    - c. Ammonium Sulfate 21-0-0, 1/4-pound
    - d. Agricultural gypsum 1.5 pounds
    - e. Aguinada GPS2 15 percent by volume
  3. Broadcast organic soil amendments uniformly over surface of the area to be treated. Roto-till the top 6 inches of planting areas to evenly distribute the amendments and conditioners into the soil.
- I. Pre-Planting Weed Abatement:
1. Protect from damage all existing plants to remain.
  2. Manually remove all existing vegetation and dispose off-site.
  3. Fertilize all planting areas with urea 35-0-0 commercial fertilizer, applied at rate of one-half pound per 1000 square feet.
  4. Water all planting areas thoroughly and continuously for a period of two to three consecutive weeks or until the weed seeds have germinated.
  5. When there is sufficient weed seed germination, apply a post-emergent contact weed killer according to directions of the manufacturer.
  6. Allow sufficient period of time to ensure that all weeds are dead. Follow herbicide manufacturer's directions.
  7. Water all planting areas thoroughly and continuously for a period of three consecutive weeks. A shorter watering period may be permissible at the discretion of District Representative after

consultation with Architect (Landscape Architect) or District's pest control advisor (if applicable). Discontinue watering process for one day prior to second application of herbicide spraying. Reapply the spraying operation with a straight contact weed killer according to pest control advisor's recommendations. Allow minimum of 4 days without irrigation for effective final weed kill.

8. Clear all desiccated weeds from slope to the finished grade, remove from site and dispose of in a legal manner.
9. Allow surface of soil at all planting areas to dry out for one day only prior to planting. Exercise care to not allow solid surface to be super-saturated with water prior to hydroseeding application. At the same time, soil surface should not be bone dry. There should be some residual moisture within the first 1/4-inch of soil surface.

### 3.03 FINAL FINISH GRADING

- A. Final Finish Grading: After performing soil amendment process, regrade as necessary to achieve final grades.
  1. Grades shall be smooth and even on a uniform plane with no abrupt changes or pockets, and shall slope away from all buildings.
  2. Verify the surface drainage of all planting areas, and notify District Representative and Architect of all discrepancies, obstructions, or other conditions considered detrimental to plant materials and proper drainage.
- B. Grading Offsets: After initial settlement, finish grade in planting areas shall be lower than the adjacent walks, curbs, and headers by the following amounts:
  1. Lawn areas: 3-inch
  2. Tree, shrub and groundcover areas: 2-inches
- C. Tolerances:
  1. Finish Grade: Plus or minus 1/2-inch from finish elevation indicated in contract documents.
- D. Weeding: Before and during finish grading, remove weeds and grasses, including roots, and dispose of off-site.

### 3.04 PROTECTION

- A. Protection, General:
  1. Protect all plant life, existing construction and site features not indicated to be removed or modified.
  2. Preserve all existing site features, such as rock outcroppings, slopes and storm drainage swales, piping and appurtenant structures.
  3. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic, both on and off site.
  4. Refer to general requirements specified in Section 01 56 00 – Temporary Barriers and Enclosures for protective barriers, covers and signs.

- B. Protection of Trees, Shrubs and Ground Covers:
  - 1. Protect existing trees, shrubs and other indicated vegetation to remain.
  - 2. Provide and maintain temporary guards to encircle trees or groups of trees. Refer to Section 01 56 00 – Temporary Barriers and Enclosures.
  - 3. Restrict traffic and do not stockpile materials and restrict traffic within drop line of trees.
  - 4. Provide burlap covers or other approved ventilated covers over shrubs and small trees to protect them from dust and wind damage.
- C. Protection of Roads and Walks: At all times, keep roads, streets, walks and other public thoroughfares clear and free from dirt and debris.
- D. Damage Utilities: Should a utility line or structure be damaged, immediately notify the responsible utility company or agency and notify District representative and Architect.
  - 1. Repair and/or replace all damaged utility lines and structures as directed by the responsible utility company or agency.
  - 2. Repair or replacement of damaged utility lines and structures whose location or existence has been made known to the Contractor shall be at no change in Contract time and Contract Sum.
  - 3. Encounters with unknown utility lines and structures shall be governed by provisions if the General Conditions of the Contract.

END OF SECTION 32 91 00

SECTION 32 92 00 HYDRO-SEEDING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Hydro-Seeding, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Hydroseeded lawn areas.
- D. Initial maintenance of lawns.
- E. Related Sections:
  - 1. Section 31 22 19– Finish Grading: Requirements for precise grading prior to preparation of landscaped areas.
  - 2. Section 32 84 00 – Irrigation Systems: Irrigation systems for landscaping.
  - 3. Section 32 97 00 – Landscape Maintenance: Maintenance for lawns during contract period.

1.02 DEFINITIONS

- A. Weeds: Include Dandelions, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.03 SUBMITTALS

- A. Samples: Soil amendment, in manufacturer’s original unopened packaging with identifying labels affixed and legible in accordance with state law.
- B. Documentation of Availability of Plant Materials: Submit documentation at least 60 days prior to planting that all plant materials are available.
- C. Certifications: Hydroseed
  - 1. Invoice or shipping notice evidencing that the hydroseeding products have been provided to project site as specified.
  - 2. Certificate from producer certifying that seed mixes comply with specified see types and percentages.
- D. Construction Schedule: At pre-construction meeting, provide a written projected planting schedule noting the estimated completion date, number of working days required and any special coordination requirements.
- E. Test Reports: Agronomic soils report. See PART 3, herein, for testing requirements.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements of authorities having jurisdiction.
  - 1. Fertilizer and Herbicide: Provide certificate of compliance from governing authority having jurisdiction indicating approval of fertilizer and herbicide mixture.
  - 2. Plant Materials: Certified by state department of agriculture; free of disease and hazardous insects.
- B. Hydroseed Producer's Qualifications: Company specializing in lawn and seed production and harvesting, with minimum five years experience, and certified by the State of California.
- C. Hydroseed Applicator's Qualifications: Company approved by or accepted to hydroseed producer.
- D. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- E. Source Quality Control: Ship landscape materials with certificates of inspection required by authorities having jurisdiction. Comply with regulations applicable to landscape materials.
  - 1. Substitutions: Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Owner and Architect, together with proposal for use of equivalent material.
  - 2. Analysis and standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
  - 3. Soil amendments: Before delivery of topsoil, submit independent laboratory analysis of topsoil fill. Analysis shall indicate percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value. Submit data to independent testing and inspection agency for project, as specified in Section 01450 – Quality Control, for approval.
- F. Reviews by Owner and Architect:
  - 1. All reviews specified herein will be made by the Landscape Architect or an independent testing and inspection agency, as directed by Owner's Representative.
  - 2. Reviews will be required at the following progress point in the work:
    - a. Soil Work:
      - 1) When excavation, backfilling, compacting and rough grading are completed in landscape areas but prior to soil preparation.
      - 2) At completion of soil preparation and finish grading
    - b. Lawn Areas:
      - 1) Preinstallation conference.
      - 2) Lawn areas: After hydroseeding.
    - c. Pre-maintenance review.
    - d. Substantial Completion review, prior to submission of final application for payment.
  - 3. Contractor shall notify Owner's Representative, Architect and Project Inspector in writing via FAX no earlier than 48 hours before intended time for conferences, observations and reviews.
- G. Compliance Testing: Owner may perform testing of raw materials used for soil preparation. In addition, tests may be performed to verify proper blending and quantities of materials used in conditioning soil in planting areas.



1. Test shall be performed by an agricultural soils testing laboratory selected by the Owner. Owner will pay for testing if compliance is verified.
2. In the event of noncompliance, the Contractor at no change in contract time and contract sum shall make necessary corrections by adding, properly mixing, or otherwise adjusting backfill mixes in the manner to be specified by the Architect.
3. Contractor shall pay for testing that shows any noncompliance and any subsequent testing required until conformance has been attained.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Product materials from deterioration during delivery, and while stored at site.
- B. Delivery: Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade mark, and conformance to state law.

1.06 PROJECT CONDITIONS

- A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Owner and Architect before planting.
- C. Coordination with Underground Utilities and Obstructions: Verify the locations of all underground utilities and other obstructions that may affect landscaping work. Report to Owner and Architect obstructions encountered which are detrimental to proper installation of plant materials and accessories.

1.07 WARRANTY

- A. Warranty for Hydroseeding Areas: 100 percent growth and germination at the end of 120 day maintenance period.

PART 2 - PRODUCTS

2.01 PLANTING SOIL AND SOIL AMENDMENTS

- A. Planting Soil:
  1. Existing soil on the site shall be used as planting soil. Existing soil shall be prepared as necessary to be free of debris, oil, weeds, or other foreign matter detrimental to plant growth. Contaminated soil shall not be used but shall be removed and replaced with acceptable existing soil or imported soil.
- B. Soil Amendments, General: Provide soil amendments according to soil testing as specified in PART 3 herein. Products specified below shall be assumed for bid purposes.
- C. Organic Amendment: Nitrogen stabilized organic amendment, derived from redwood sawdust, fir sawdust or fir bark. Amendment derived from pine will not be acceptable.

1. Nitrogen: Percent stabilized nitrogen (N) based on dry weight
    - a. Redwood based amendment: 0.5 percent
    - b. Bir-based amendment: 0.8 percent
    - c. Fir bark-based amendment: 1.0 percent
  2. Particle Size: Fine texture, with minimum 80 percent passing #8 screen and minimum 90 percent passing #4 screen.
  3. Salinity: Ensure that saturation extract conductivity does not exceed 3.5 milliohms per centimeter at 25 degrees C. as determined by saturation extract method.
  4. Iron Content: Minimum 0.08 percent dilute acid soluble Fe on dry weight basis.
  5. Ash: 0 to 6 percent of dry weight.
- D. Mineral Amendment:
1. Soil Sulfur: Agricultural grade sulfur containing minimum of 99 percent sulfur expressed as elemental.
  2. Iron sulfate: 20 percent iron expressed as metallic iron, derived from ferric and ferrous sulphate, 10 percent sulfur expressed as elemental.
  3. Calcium Carbonate: 95 percent lime as derived from oyster shells.
  4. Gypsum: Agricultural grade product containing 98 percent minimum calcium sulphate.
- E. Herbicides: EPA registered and approved, of type recommended by manufacturer for application.
1. Pre-planting herbicide: Round-Up or approved equivalent.
  2. Pre-emergent weed control: Ronstar-G, or approved equivalent.
- 2.02 HYDROSEED
- A. Hydroseed Mixtures: As indicated on the contract drawings.
1. Hydroseed mix shall be specified seed species mixed with mulch, polymer and binder, in percentage compositions indicated in the planting legend on the drawings.
  2. Hydroseed mix shall be mechanically pre-mixed and delivered in original, unopened containers bearing the producer's guaranteed analysis, germination percentage and certificate of release by county agricultural commissioner having jurisdiction.
  3. When dispersed in a uniform slurry, hydroseed mix materials shall result in an absorbent, porous mat that provides suitable medium for vigorous growth of seed.
- B. Grass and Plant Seed for Hydroseeding: Fresh, clean, pure new crop seed, species and proportions as indicated in the planting legend on the drawings.
1. Label seed and provide in sealed containers with signed copies from vendor certifying that each container is fully labeled in compliance with State Agricultural Code and is in compliance with minimum requirements specified.
  2. Wet, moldy or damaged seed will not be acceptable.

- C. Hydroseeding Fertilizer: For bid purposes, provide the commercial fertilizer in hydroseeding mixture for grass areas. Hydroseeding fertilizer shall be 6-20-20, 300lbs. per acre.
- D. Hydroseeding Fiber Mulch: Hydro-Mulch as produced by Conwed or approved equivalent.
  - 1. Mulch shall be composed of wood cellulose fiber and containing no germination or growth-inhibiting factors.
  - 2. Mulch shall have consistent texture, remain suspended in agitated water and shall disperse evenly in slurry mix.
  - 3. Provide mulch with a temporary green dye.
  - 4. Mulch shall have the following components:
    - a. Moisture content: 9.0 percent plus 3 percent o.d. basis.
    - b. Organic matter: 99.2 percent plus 0.8 percent.
    - c. Ash content: 0.8 percent plus 0.2 percent.
    - d. pH: 4.8 plus 0.5
    - e. Water holding capacity (grams of H<sub>2</sub>O per 100 grams of fiber): 1540 minimum.
- E. Amended Hydroseed Fertilizer: Ureaform 38-0-0 Win 27 percent, for application at rate of 150 pounds per acre.
- F. Unamended Hydroseed Fertilizer:
  - 1. Ureaform 38-0-0 Win 27 percent, for application at rate of 300 pounds per acre.
  - 2. Triple 15 commercial fertilizer, for application at rate of 300 pounds per acre.
  - 3. Soil sulfur, for application at rate of 300 pounds per acre.
  - 4. Agricultural gypsum, for application at rate of 1200 pounds per acre.
- G. Organic Stabilizer (Binder): Ecology Controls, M-Binder organic seeding additive, or approved equivalent.
- H. Hydroseed Slurry Additives: Each hydroseed mix shall have the following additives:
  - 1. Conwed 100 % wood fiber 1500 lbs/acre (at slopes 5:1 and lower).
  - 2. Conwed 100% wood fiber 2500 lbs/acre (at slopes 4:1 and greater).
  - 3. HydroPost Compost 1000 lbs/acre
  - 4. Ecology Controls M Binder 100 lbs/acre
  - 5. 6-20-20 Fertilizer 300 lbs/acre
- I. Water: Fresh, clean, free of impurities, excessive chlorine and salts.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Protection: Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations

- B. Erosion Control: Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties and walkways.

### 3.02 EXAMINATION

#### A. Examination of Finish Grading:

1. Verify that finish grading is acceptable.
2. Saturate soil with water to test drainage.

#### B. Agronomic Soils Testing: Testing will be performed by testing agency selected and paid by Owner.

1. Samples of the native soil shall be submitted to the agronomic soils testing laboratory after rough grading and prior to soil preparation.
2. Two samples shall be taken of the site soil, at a depth of 6 to 12 inches, within proposed planting areas, after completion of grading and prior to weed control and soil preparation.
3. Testing will be performed for fertility and suitability analysis, with written recommendations for soil amendment, fertilizer and chemical conditioners, application rates for soil preparation, planting backfill mix and post-maintenance fertilization programs.
4. Agronomic soils analysis and report recommendations shall take precedence over the amendment and fertilizer application rates specified in this section.
5. On receipt of a soils analysis and recommendations, a change order will be issued if revision to soil treatment is required which results in change in the contract sum and contract time.
6. At Owner's option, additional soil testing will be conducted for organic suitability after completion soil preparation in planting areas.

#### C. Moisture Conditions:

1. No final grading or soil preparation work shall be performed when moisture content of soil is so high that excessive compaction will occur nor shall final grading or soil preparation work be performed when moisture is so low that dust will form in the air or clods will not break readily.
2. Allow soil to dry as necessary to eliminate moisture.
3. Apply water as necessary to provide suitable moisture content for tilling and planting.

### 3.03 LAWN AREAS CLEARING

#### A. Clearing of Planting Area: Before soil amendment work commences, clear all planting areas of existing vegetation not otherwise removed under site clearing work. Landscape grading and soil preparation shall be performed after work specified in other sections has been completed in planting areas, except irrigation system installation.

1. Clear and clean soil of roots, plants, grasses, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth and unsightly in appearance.

2. Remove soil contaminated by construction activities, which might not be detrimental to healthy growth and appearance of landscaping. Replace soil with topsoil at no change in contract time or sum.
  3. Maintain previously established grades, swales and drainage patterns.
  4. Remove temporary erosion protection measures or maintain in place as directed.
- B. Scarifying: Scarify subgrade to depth of 10- to 12-inches where soil amending will be performed. Scarify in areas where equipment has been used for hauling and spreading topsoil and has compacted subsoil.

3.04 FINAL FINISH GRADING

- A. Finish Grading, General: As specified in section 32 91 00 – Planting Preparation
1. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
  2. Make minor modifications to grade as may be necessary to establish required final grade. Accommodate mixing of soil amendments and fertilizers into soil. Allow for settling of soil in planting areas.
  3. Shape planting areas as indicated on drawings or as necessary for proper planting and drainage of the site and surface drainage is away from structures.
  4. Final grades at lawn areas shall be 3-inches below adjacent paving, valve boxes, headers, clean-outs, drains, manholes, and other features adjacent to and within planting area.
  5. Final grades at shrub areas shall be 2-inches below adjacent paving, valve boxes, headers, clean-outs, drains, manholes, and other features adjacent to and within planting area.
  6. Eliminate erosion scars prior to commencing landscaping maintenance period.
- B. Fine Grading: After performing soil amendment process, regrade as necessary to achieve final grades. Perform fine grading in limited areas that can be planted in the immediate future.
1. Grade planting areas to a smooth, uniform surface plane with a loose, uniformly fine texture.
  2. Grade to within plus or minus ½ inch (13mm) of finish elevation.
  3. Grades shall be smooth and even on a uniform plane with no abrupt changes or pockets, and shall slope away from all structures.
  4. Verify the surface drainage of all planting areas, and notify Owner and Architect of all discrepancies, obstructions, or other conditions considered detrimental to plant materials and proper drainage.
  5. Roll amended soil with 200 pound water-ballasted roller. Rake and drag lawn areas to remove ridges and fill depressions, as necessary to meet final grades.
- C. Grading Offsets: After initial settlement, finish grade in lawn and grass areas shall be lower than the adjacent walks, curbs, and headers by 3-inches.

- D. Restoration: Restore lawn areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

### 3.05 WEED ABATEMENT

#### A. Pre-Planting Weed Abatement:

1. Protect from damage all existing plants to remain.
2. Manually remove all existing vegetation and dispose off-site.
3. Fertilize all planting areas with urea 35-0-0 commercial fertilizer, applied at rate of one-half pound per 1000 square feet.
4. Water all planting areas thoroughly and continuously for a period of two to three consecutive weeks or until the weed seeds have germinated.
5. When there is sufficient weed seed germination, apply post-emergent contact weed killer according to directions of the manufacturer.
6. Allow sufficient period of time to ensure that all weeds are dead. Follow herbicide manufacturer's directions.
7. Water all planting areas thoroughly and continuously for a period of three consecutive weeks. A shorter watering period may be permissible at the discretion of the Architect or Owner's authorized representative, or Owner's pest control advisor (if applicable). Discontinue watering process for one day prior to second application of herbicide spraying. Reapply the spraying operation with a straight contact weed killer according to pest control advisor's recommendations. Allow a minimum of 4 days without irrigation for effective final weed kill.
8. Clear all desiccated weeds from the slope to the finished grade, remove from site and dispose of in a legal manner.
9. Owner may shorten or eliminate weed abatement period if deemed necessary.

### 3.06 HYDROSEEDING

#### A. Hydroseeding Equipment:

1. Hydraulic equipment used for the application of the fertilizer, seed and slurry of prepared wood pulp shall have a built-in continuous system and operating capacity sufficiently to agitate, suspend and homogeneously mix a slurry containing not less than 40 pounds of fiber mulch plus a combined total of 7 pounds fertilizer solids for each 100 gallons of water.
2. Slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will prove a continuous non-fluctuating discharge. Capacity requirement is 1500gallons, mounted on a traveling unit. Either self-propelled or drawing by a separate unit which will place slurry tank and nozzles within sufficient proximity of areas to be seeded.

- B. Pesticide Application Equipment: Hydraulic equipment used for application of pesticides shall consist of a clean 150 gallon minimum capacity fiberglass tank with complete mechanical agitation. Pump volume shall be 10 gallons per minute while operating at a pressure of 100 pounds per square inch (psi). Distribution lines shall be large enough to carry the volume of water necessary for even

chemical distribution. Spray nozzle shall cover a 15-foot swath, with minimum output of 5 gallons per minute at 80 pounds per square inch.

C. Hydroseeding Operation:

1. Mixes shall be that which is included in plant legend.
2. All hydroseeded areas to be applied by an approved hydromulch company.
3. The hydromulch shall be applied in form of slurry, consisting of cellulose fiber, seed, chemical additive, commercial fertilizer and water. When hydraulically sprayed on the surface, the hydro-mulch shall form a blotter-like groundcover impregnated uniformly with seed and fertilizer and shall allow the absorption of moisture and rainfall to percolate to the underlying soil.
4. Ensure that application equipment has a built-in agitation system and operating capacity sufficient to agitate, suspend and mix slurry containing not less than 40 pounds of fiber mulch plus a combined total of 7 pounds fertilizer solids for each 100 gallons of water.
5. Slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will provide a continuous non-fluctuating discharge. Capacity requirement is 1500 gallons, mounted on a traveling unit, either self-propelled or drawing by a separate unit which will place slurry tank and nozzles within sufficient proximity of areas to be seeded.

D. Hydroseeding Slurry Preparation: Mix seed and water in tank.

1. Slurry preparation shall be at project site and shall begin by adding water to tank with engine at half throttle.
2. When water level has reached the height of the agitator shaft, full circulation shall be established; and at that time, seed shall be added to tank.
3. Fertilizer shall be added, followed by mulch.
  - a. When tank is one-third full, add fertilizer. Begin to add mulch.
  - b. By the time tank is 2/3 to 3/4 full, all mulch shall be in.
4. Commence spraying immediately when tank is full.

E. Hydroseed Slurry Application:

1. Spray hydroseed as uniform visible coat, using green color dye as a guide. Apply the slurry in a sweeping motion, in an arched stream so as to fall like rain allowing the wood fibers to build on each other until a good coat is achieved and the material is spread at the required rates.
2. Bare, sparse or damaged hydroseeded areas shall be repaired at no change in contract sun or contract time.
3. Do not allow any slurry to be sprayed into any reservoir basin or drainage ditches and channels which may impede the flow of rain or irrigation water. Clean up all spilled slurry.
4. After application of hydro-mulch, wash excess material from previously planted materials and architectural features. Avoid washing or eroding mulch materials.

5. If slurry has not been applied within two hours of mixing, mixture will be rejected and new slurry shall be mixed at no change in contract sum or contract time. Remove rejected slurry from site and legally dispose of it.
6. Daily worksheets shall be filled out by nozzlelemen. One copy shall be submitted to Owner's authorized representative. Worksheets shall be signed by nozzlelemen and Owner's representative. The following information shall be recorded on worksheets:
  - a. Seed: Type and amount.
  - b. Fertilizer: Type and amount.
  - c. Mulch: Type and amount.
  - d. Seeding additive: Type and amount.
  - e. Loads: Number.
  - f. Water: Amount.
  - g. Coverage: Area in acres.
  - h. Equipment used: Capacity and vehicle license number, if applicable.
7. Protection at hydroseeding areas: Special care shall be exercised by Contractor in preventing slurry from being sprayed into any reservoir basin or drainage ditches and channels which may impede the flow of rain or irrigation water.
8. Cleaning after Hydroseeding:
  - a. All slurry spilled into restricted areas shall be cleaned up at the Contractor's expense to the satisfaction of the Owner.
  - b. Immediately following application of hydromulch, the Contractor shall wash excess material from previously planted materials and architectural features. Cares shall be exercised to avoid washing or eroding mulch materials from areas.

F. Hydroseed Mix and Application Rates: Mix for grass areas shall be composed of the following:

Seed	435 pounds/acre	12 pounds/1000 sq. ft.
Fiber mulch	1500 pounds/acre	46 pounds/1000 sq. ft.
Binder	100 pounds/acre	6.2 pounds/1000 sq. ft.
Fertilizer	435 pounds/acre	10 pounds/1000 sq. ft.
Water	3600 pounds/acre	83 gallons/1000 sq. ft.

3.07 INITIAL LAWN AND GRASS AREA MAINTENANCE

- A. Initial lawn and Grass Area Maintenance: Perform initial maintenance and continue maintenance until commencement of maintenance period specified in section 32 97 00 – Landscape Maintenance.
- B. Watering: Watering lawns and grass areas at such frequency as weather conditions require, to replenish soil moisture below root zone.
- C. Weed control: If needed, control broad leaf weeds with selective herbicides.
- D. Mowing of Lawn and Grass Areas:
  1. Commence mowing of lawn and grass areas when grass has reached height of 1-1/2 inches minimum.
  2. Mow grass to height of 1-1/2 inches minimum whenever average height exceeds 2-inches.



3. Trim paved edges of lawns (sod) whenever lawn is mowed. Trim paved edged of grass (hydroseeded) areas at least twice monthly.
4. Grass shall be well established and free of bare spots and weeds at Substantial Completion review.
- E. Cleaning: Clean up grass clippings during and after mowing. Remove clippings from site and dispose of clippings legally.

### 3.08 CLEANING AND PROTECTION

- A. Periodic Cleaning: Keep all areas of landscaping work clean, neat and orderly at all times during the period of contract. Clean all construction areas at the ned of each day.
  1. After planting operations are complete, remove all trash, excess soil, empty plant containers, and rubbish from project site.
  2. Repair scars, ruts and other marks in the ground and leave ground in a neat and orderly condition.
  3. Leave work area in a broom-clean condition and wash down paved areas within the project s ite. Leave walks in a clean and safe condition.
- B. Substantial Completion Cleaning: All lawn and planting areas shall be free of debris, clippings, dead foliage and rocks not otherwise permitted. Remove from site excess soil generated from planting holes and not used for backfilling.
- C. Protection, General: During and after landscaping work and during maintenance period, protect landscaping areas from damage.
  1. Protect areas susceptible to traffic by erecting barricades immediately after planting. Maintain barricades until date established in Notice of Completion.
  2. Provide durable protective barriers, covers, signs and other temporary measures as necessary.
- D. Damaged or Injured Landscaping: Treat, repair or replace damaged or injured landscape planting, as directed.

### 3.09 REVIEW AND ACCEPTANCE

- A. Substantial Completion Review: At the completion of all landscape planting operations and prior to the beginning of the initial maintenance period, a Substantial Completion Review shall be held.
  1. Satisfactorylawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, voids, bare areas and surface irregularities.
  2. Remedial measures: Re-establish lawns that do not comply with specified requirements and continue maintenence until lawns are satisfactorily established.
- B. Final Review for Acceptance: Within three claendar days prior to the date established in the Notice of Completion, a final Review shall be held to review the state of planting materials and maintenance procedures.
  1. When landscaping work is completed, including maintenance, Owner and Architect will conduct a review to determine acceptbaility of landscaping work.
  2. Deliver requests for review in writing to Owner and Architect no less than seven calendar days prior to requested review date.

3. Reviews shall be scheduled at a mutually agreeable time and date. Owner, Architect and Contractor shall attend the reviews.
4. At the time of reviews, all lawn areas under the contract shall even and complete coverage and shall be free of weeds, dead leaves and trash, neatly mowed and clippings removed.

END OF SECTION 32 92 00

SECTION 32 93 00 LANDSCAPE PLANTING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Landscape Planting, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Landscape planting in the areas shown on contract drawings, including:
- D. Items not specifically indicated or specified, but normally required to conform with such intent, are considered part of work.
- E. Related Sections:
  - 1. Section 32 84 00– Irrigation Systems: Irrigation for plant materials.
  - 2. Section 32 91 00 – Planting Preparation: Fine grading and soil preparation in planting areas.
  - 3. Section 32 92 00 – Lawns and Grasses: Sodded lawns.
  - 4. Section 32 97 00 – Landscape Maintenance: Maintenance of plant materials during contract period.

1.02 REFERENCES

- A. American Association of Nurserymen, Inc. (AAN): American Standard for Nursery Stock, latest edition.
- B. American Joint Committee on Horticulture Nomenclature (AJCHN): Standardized Plant Names, latest edition.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer’s complete descriptive literature and specifications for proprietary materials and any additional items required by the (Landscape) Architect.
  - 1. Submit complete list of plant materials to be provided, including unit prices for plants and for installation. Include:
    - a. Quantity.
    - b. Size.
    - c. Botanical name.
    - d. Plant unit price.
    - e. Installation unit price.
  - 2. Submit product data on additional items as directed by Architect.
- B. Documentation of Availability of Plant Materials: Submit documentation at least 30 days prior to planting that all plant materials are available.
- C. Samples:
- D. Delivery may begin upon acceptance of samples.

1. Soil amendments and soil conditioners.

E. Quality Control Submittals:

1. Substitution Requests: If any plant specified is not obtainable, submit a written substitution request to the Architect during the bidding period. Substitutions of plant materials will not be permitted unless accepted in advance in accordance with provisions specified in section 01600 – Product Requirements.
2. Certificates:
  - a. Imported Topsoil:
    - 1) Furnish the source of imported topsoil to the Architect for review.
    - 2) Submit test results and schedule of recommended soil amendment adjustments to the Architect for review.
  - b. Bulk Materials: Furnish a Certificate of Delivery with each delivery of material in containers or in bulk. State source, quantity, weight, type and analysis, and the date of delivery. Submit certificates for the following, upon delivery to project site:
  - c. Fertilizers and minerals.
  - d. Soil amendments.
  - e. Other soil additives, per agronomic soils test report.
3. Test Reports: In accordance with requirements specified below under Article titled “SOURCE QUALITY CONTROL,” SUBMIT Agronomic Soils Test Report to Architect prior to preparation of soil treatment or ordering plant material.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Nursery Qualifications:

- a. Regularly engaged, for the preceding 10 years, in the production of planting materials equivalent in species and size to those required.
- b. Stocked, and having a demonstrated ability, to provide plant materials required within the constraints of the accepted construction schedule.

2. Landscaper’s Qualifications:

- a. Regularly engaged and specializing, for the preceding 10 years, in the installation and maintenance of planting materials equivalent in species and size to those required.
- b. Capable of furnishing a verifiable list of not less than five projects of equivalent type successfully completed within the preceding 2 years.

- B. Pre-installation Conference: Schedule in advance of beginning work of this section. Arrange for attendance by District Representative, Architect, Landscape Architect, and landscaping subcontractor. Review intent of contract documents and resolve conflicts. Prepare minutes of conference and distribute to attendees within 3 days.

C. Compliance Testing:

1. Testing will be performed by laboratory selected and paid by District.

2. In the event of noncompliance, the Contractor at no change in contract time or contract sum, shall make necessary corrections by adding, properly mixing, or otherwise adjusting backfill mixes in the manner to be specified by the Architect.
3. Contractor shall pay for testing that shows any noncompliance and any subsequent testing required until conformance has been attained.

#### 1.05 DELIVERY, STORAGE AND HANDLING

##### A. Selection, Tagging, and Ordering Plant Material:

1. Submit a request for review and documentation to the Architect at least 3 months prior to start of landscape planting work that plant material has been ordered.
2. Bulk Materials: Plants shall be subject to examination and acceptance-review by the Architect after delivery, for conformance to specifications.

##### B. Delivery: Deliver accessory materials in manufacturer's original, unopened packaging with identifying labels affixed and legible in accordance with state law. Deliver plants with identifying tags affixed. Contractor shall notify Architect 48 hours in advance of plant material delivery for observation. The following will be rejected:

1. Plant materials not identifiable as species specified for project.
2. Materials not accompanied by required certificates.
3. Protection of plants during delivery has not been adequate to prevent damage to football, trunks, or desiccation of leaves.
4. Plant material not matching the form, shape, or growth habit required for the design intent of the project.

##### C. Storage and Handling: Except as otherwise permitted, store materials off-ground and protected from damage. Contractor shall be responsible for maintenance tasks after plant material has been secured, including watering, fertilization, pruning, spraying, weeding, and boxing as required.

1. Protect plants from sun or drying winds. Protect and maintain plants that cannot be planted immediately upon delivery.
2. Do not drop plant materials.
3. Do not pick up container plant material by stems or trunks.

#### 1.06 PROJECT CONDITIONS

- A. Environmental Requirements: Do not perform planting or related operations under weather conditions which would adversely affect the subsequent growth and health of plant materials.
- B. Scheduling: Install trees, shrubs, and ground cover plant material after irrigation system is operable.
- C. Protect work and materials from damage due to construction operations by other contractors and trades and by vandalism. Maintain protection during installation and maintenance period.

#### 1.07 SCHEDULING

- A. Within one month after the commencement of construction, furnish documentation to the Architect that all plant material has been obtained. Contractor shall be responsible for payments required by the grower to secure plant materials indicated on the contract documents.

## 1.08 WARRANTY

### A. Plant Materials:

1. Plant materials furnished or relocated under this section shall be warranted in writing, for a period of 1 year and 6 months for all other material, against improper installation, and against defective, unsound, or diseased conditions that may appear from date of final acceptance.
2. Upon receipt of written notice from District of the loss of any warranted plant materials during the warranty period, the subject plant materials shall be promptly replaced with the same species originally planted, and of a size closely approximating the size of the plant if normal growth had occurred since the original planting. Replacements shall be subject to the requirements of this specification.
3. When plants are replaced, advise the District representative in writing, of the new establishment maintenance period.
4. Contractor shall not be held liable for loss of plant materials that have not been maintained properly by District.
5. The expense of replacement shall be paid by the Contractor if replacement is necessary during the warranty periods.
6. Plant material must be replaced within 15 days of written notification and shall be installed in accordance with these specifications.

## PART 2 - PRODUCTS

### 2.01 PLANT MATERIALS

- A. Plant Materials, General: Provide plants in a healthy, vigorous growing condition.
- B. Identification: Plant material shall be true to type and nomenclature in accordance with AJCHN Standardized Plant Names, and each bundle or plant shall be properly identified with durable, legible labels.
- C. Quality and Size of Plants: In accordance with rules and grading of AAN American Standard for Nursery Stock, and as indicated on the contract drawings.
  1. The size of plants will correspond with that normally expected for species and variety of commercially available nursery stock. The minimum acceptable size of plants, measured before pruning with the branches in normal position, shall conform with the measurements indicated on the contract drawings in the list of plants to be furnished and as determined by the Architect. Plants larger in size than specified may be used with the approval of the Landscape Architect. If larger plants are approved, the ball of earth or spread of roots for each plant will be increased proportionally.
    - a. Plants that meet the measurements specified, but do not possess a normal configuration or balance of height and spread, will be rejected.

- b. Plants that have encircling roots (but not root bound) shall have root balls lightly slashed on a minimum of three sides.
2. Trees, shrubs, vines, and ground covers shall have a normal habit of growth and shall be sound, healthy, vigorous, and free from insect infestations.
3. Trees and shrubs shall have been grown in containers of the size stated in drawings, and shall have sufficient roots to hold the root ball together after removal from containers without being root bound.
4. Trees will be straight and of uniform shape without damaged, crooked, or multiple leaders. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs over 1/2-inch which have not been pruned and painted or completely callused, will be rejected.
5. Trees specified to be mutli-trunked shall have at least three main leaders from base.
6. Provide matching forms and sizes for plant materials within each species and size indicated on the contract drawings.
7. Ground cover plants shall be grown in flats or as indicated on the contract drawings. Flatground plants (rooted cuttings) shall remain in original flats until transplanting. Soil shall contain sufficient moisture so that it will not fall apart when lifting the plants.

## 2.02 ACCESSORIES

- A. Tree Staking Materials: Provide one of the following:
  1. Wood Stakes: Two-inch diameter by 12-foot long lodge pole pine stakes, treated with pentachlorophenol.
- B. Ties: 24- to 32-inch VIT Cinch Ties.
- C. Guying Materials for On-Grade Planting:
  1. Guy Wire: No. 9 gage, galvanized, twisted clothesline type.
  2. Anchor System: Duckbill Earth Anchor System, as manufactured by Foresight Products, Inc., Commerce City, CO, (800/325-5360).
    - a. Box Trees, Sizes 24-inch Box to 72-inch Box: Model 68 DTS.
    - b. Box Trees, Sizes 84-inch and Larger: Model 88-DTS.
  3. Hose: 3/4-inch reinforced black rubber garden hose for covering wires.
  4. Flags: White neoprene hose, 3/8-inch diameter, 5 feet long.
  5. Anchors for holding guys: 1-inch galvanized eye-bolt with lead expansion shield.
- D. Sand: Washed plaster sand.
- E. Bark Mulch:
  1. Mulch shall be "small" fir bark mulch, as manufactured by Whittier Fertilizer.
  2. Mulch shall consist of fir bark mulch with a particle range of 3/4 to 1-1/2-inch in diameter. Shredded bark is not acceptable.

- F. Rock Mulch:
  - 1. "Desert Gold" decomposed granite.
- G. Vine Anchors: Tumax Plant Anchors.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verification of Conditions: Prior to work of this section, examine and verify that previously installed work is complete and as required, to the point where this installation may properly commence.
  - 1. Verify that building construction adjacent to landscaping area is complete and that landscape irrigation systems are in place and accepted by the Architect.
  - 2. Verify that final grades have been established prior to beginning planting operations.
  - 3. Inspect trees, shrubs, and liner stock plant material for injury, insect infestation, and trees and shrubs for improper pruning.
  - 4. Do not begin planting until deficiencies are corrected.

#### 3.02 PREPARATION

- A. Layout of Planting Areas: Locations for plants and outlines of areas to be planted shall be marked on the ground by Contractor before any plant pits are dug.
  - 1. Locations shall be reviewed by the Architect (Landscape Architect). If an underground obstruction or utility line is discovered prior to work, alternate locations for plants may be selected by the Architect (Landscape Architect).
  - 2. Stake, or mark with lime, locations for plants and outline of planting beds on ground. Do not begin excavation until plant locations and plant beds are reviewed by the Architect (Landscape Architect). The irrigation system shall be operational and accepted prior to planting.
- B. Field Samples: Prior to planting, prepare one plant in pit with standpipe, gravel, filter fabric, and root barriers for each tree size to be reviewed by the Architect (Landscape Architect).
  - 1. Do not cover standpipes.
- C. Protection: Protect previously installed work and materials that may be affected by work of this section.
  - 1. Provide safeguards and exercise caution against damage or defacement of existing improvements.
  - 2. Repair damage resulting from landscape planting operations and return the area to previous condition.
- D. Preparation:
  - 1. Soil Preparation: As specified in section 32 91 00 – Planting Preparation.



2. Pre-Planting Weed Abatement: As specified in section 32 91 00 – Planting Preparation.
  3. Finish Grading: Prior to commencement of planting operations, complete finish grading as specified in section 32 91 00 – Planting Preparation.
  4. Soil Settlement: Soil areas shall be compacted and settled by application of heavy irrigation to a depth of 12 inches.
  5. Pre-Emergent Weed Control: Immediately after planting, apply pre-emergent weed control to planted areas which will not be seeded.
- E. Soil Fertilizing: Apply and incorporate fertilizer and amendments into the soil as specified prior to jute netting installation.

### 3.03 PLANTING OPERATIONS

#### A. General:

1. Excavation for planting shall include the stripping and stocking of all acceptable soil encountered within the areas to be excavated for trenches, tree holes, plant pits, and planting beds.
2. Excess soil generated from the planting holes and not used as backfill or in establishing the final grades shall be removed from the site. Do not allow excess soil removed from planting pits or alter established grades.
3. Plant Pits:
  - a. Install trees and shrubs in round pits with vertical sides having widths equal to twice the diameters, and depths equal to the heights of the root balls or containers plus 12-inches. Scarify sides and bottom of plant pits.
  - b. One plant pit for each size of tree shall be prepared with filter fabric, gravel, and stand pipe for review by Architect (Landscape Architect) prior to any planting.
4. Protect areas from excessive compaction when trucking plants or other materials to planting site.
5. Can Removal:
  - a. Cut cans on two sides with an acceptable can cutter. Do not injure the root ball. Do not cut cans with spade or ax.
  - b. Carefully remove plants from cans without injury or damage to root ball.
  - c. After removing plant, superficially cut edge roots with knife on three sides.
  - d. For plants with sensitive roots, place can intact in plant pit 1-1/2 times the size of a standard plant pit. Insert blades of sharp, needle-nose shears into a drain hole and cut the can bottom away. Remove bottom from pit. Follow with a cut down one side of the can from top to bottom. Repeat cut on opposite side. Fill plant pit with prepared plant pit mixture. Carefully remove the detached pieces.
6. Box Removal:
  - a. Remove bottom of plant boxes before planting.
  - b. Removes sides of box without damage to root ball after positioning plant and partially backfilling.
7. Setting Larger Plants:

- a. Center plants and set on native soil that has been puddle and settled.
  - b. Set plants with the top of root ball 2-inches above finish grade and rotated to give the best appearance in relationship to adjacent structures or surroundings.
  - c. Face plants with fullest growth into prevailing wind.
  - d. Use appropriate backfill mix to continue filling plant pits. Set plant plumb. Brace rigidly in position until backfill mix has been tamped solidly around root ball. When 3/4 of the pit is backfilled, water thoroughly, saturating the root ball. Continue filling pit to finish grade with backfill mix.
  - e. Planting pit shall be backfilled with the following soil conditioner and organic amendment, per cubic yard:
    - 1) Application Rates:
      - a) Potassium sulfate 0-0-50, 1/4-pound
      - b) Single Superphosphate 0-20-0, 1/4-pound
      - c) Ammonium sulfate 21-0-0, 1/4/-pound
      - d) Agricultural gypsum 1.5 pounds
      - e) Good humus 15% by volume
    - 2) Planting Tablets:
      - a) 1-gallon plant - 1 tablet
      - b) 5-gallon plant - 3 tablets
      - c) 15-gallon plant - 5 tablets
      - d) 24-inch box tree - 7 tablets
      - e) 30-inch box tree - 7 tablets
      - f) 36-inch box tree - 8 tablets
      - g) 42-inch box tree - 8 tablets
      - h) 48-inch box & larger - 12 tablets
  - f. When the plant pit is filled, form saucer berm around plants with backfill material sufficient to hold 2-inches of water. Remove the berm prior to dressing.
  - g. Apply root hormone at the rate recommended by the manufacturer. Tree balls shall be set before application of root hormone, and shall be mulched immediately after application of root hormone into the root ball.
  - h. Water plants immediately after planting.
8. Provide approved on-site or approved imported top soil as necessary for raised planters and bring soil up to required finish grades.
9. Staking: Immediately after planting, stake 15-gallon and 24-inch box trees as indicated on contract drawings.
10. Mulching: Spread mulch 2-inches thick in planter and areas that do not exceed 30 percent slope. Do not cover crown of shrub or tree.
11. Pruning: Pruning shall be limited to the minimum necessary to remove injured twigs and branches and to compensate for loss of roots during transplanting, but never to exceed one-third of the branching structure. Upon review by the Architect (Landscape Architect), pruning may be performed before delivery of plant, but not before plants have been reviewed. Cuts over three-quarter inch in diameter with a tree wound paint.

B. Ground Cover:

1. Install plant material in moist soil in the areas and at the spacings indicated on the contract drawings, in neat rows, ensuring complete coverage of planting areas, including under and around trees and shrubs. Spacings show in the plant list or on the contract drawings are triangular spacing, unless otherwise noted.

- a. Each rooted plant shall be planted with its proportionate amount of flat soil or in a peat pot in a manner that will ensure minimum disturbance of the root system, but in no case shall this depth be less than two nodes.
- b. Install ground cover rooted cuttings, pots, or flats after mulching.

### 3.04 FIELD QUALITY CONTROL

- A. Field Quality Control, General: Notify Architect (Landscape Architect) at least 48 hours in advance when requesting on-site reviews.
- B. On-Site Reviews: Prior to commencement of site visits, items noted in previous observation reports shall have been either completed or remedied, unless such compliance has been waived. Failure to complete prior tasks or failure to prepare adequately for scheduled observations shall obligate Contractor to reimburse Architect for additional hourly services plus transportation costs. Schedule for on-site reviews:
  1. Pre-installation conference.
  2. At delivery of plant materials and plant layout, prior to excavating pits.
  3. After planting pits have been excavated, but prior to backfilling.
  4. After initial planting operations. (One tree with each type of specified staking shall be approved prior to planting of trees.)
- C. Post-Planting Soil Testing: Conducted for organic suitability after completion of planting in the soil preparation and backfill mix areas.
  1. Submit to the testing laboratory the original amendment specification with previously issued bulletins for soil amendments and installation procedures.
  2. Provide three random samples of planting soil for analysis.
  3. Fertility analyses, recommendations, and interpretations shall be furnished by the testing laboratory to ensure that all specified amendments made have been provided.
- D. Pre-Maintenance Review:
  1. At the completion of landscape planting operations and prior to the beginning of the formal maintenance period, the Pre-Maintenance Review shall be held.
  2. Request on-site review by Architect (Landscape Architect) 5 working days prior to the completion of work in order that a mutually agreeable time for review may be arranged.
  3. At the time of review, the planting areas under contract shall be free of weeds, dead leaves and trash, neatly cultivated and raked. Stakes, guys and plant basins shall be in good order.
  4. If, after the Pre-Maintenance Review, Architect (Landscape Architect) accepts that the work has been performed in accordance with the contract drawings and specification, written notice of preliminary acceptance will be given. This report shall note items that shall be corrected and shall state date of commencement and completion of the formal maintenance period.
  5. Areas to be maintained for the formal maintenance period shall commence maintenance at the same time, as directed by the Architect (Landscape Architect). Partial areas will not be released

into maintenance prior to completion of items listed in the pre-maintenance review. The maintenance period may not be phased.

6. If, after the maintenance review, the planting areas are not accepted by the Architect (Landscape Architect), the Contractor shall reimburse the Architect for additional site visits, or additional time required, to review work. All additional time will be billed at the hourly rates of the Architect and Landscape Architect and will be paid by the District. District will execute change order and deduct amount paid from monies owed to District by the Contractor.

E. Final Review: Perform Final Review in accordance with section 32 97 00 – Landscape Maintenance.

### 3.05 CLEANING

A. Cleaning:

1. Keep all areas of the work clean, neat and orderly at all times during the period of contract. Clean construction areas at the end of each day.
2. Upon completion of planting operations, power wash all hardscape areas.

### 3.06 PROTECTION

A. Protection: Protect areas susceptible to traffic by erecting barricades immediately after planting. Maintain protection as required by section 32 97 00 – Landscape Maintenance.

END OF SECTION 32 93 00

SECTION 32 97 00 LANDSCAPE ESTABLISHMENT AND MAINTENANCE

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division 01 apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Landscape Establishment and Maintenance, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Landscaping care and maintenance of plants for 270-Day plant establishment period.
- D. Landscaping care and maintenance of lawn for 120-Day establishment period.
- E. Maintenance of landscape irrigation systems during 120-Day lawn establishment period.
- F. Related Sections:
  - 1. Section 32 14 43 – Flexible
  - 2. Section 32 84 00 – Landscape Irrigation Systems
  - 3. Section 32 91 00 – Planting Preparation
  - 4. Section 32 92 00 – Hydro-Seeding
  - 5. Section 32 93 00 – Landscape Planting

1.02 SUBMITTALS

- A. Schedule: Prior to commencing the landscape installation, submit for review two copies of schedule of establishment operations and monthly status report.
- B. Reports: During the landscape establishment period, at monthly intervals, submit two copies each of the following items:
  - 1. Provide monthly records of all fertilizers, herbicides, insecticides and disease control chemicals used for the project.

1.03 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
  - 1. Perform all work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work.
  - 2. Provide for all inspections and permits required by Federal, State and local authorities in furnishing, transporting, and installing of all agricultural chemicals.
  - 3. The County Agricultural Commissioner's Office must, by law, be given monthly record of all herbicides, insecticides and disease control chemicals used.
- B. Applicable Standards: Apply standards as described in the following:
  - 1. Fertilizing Woody Plants, University of California, Cooperative Extension Leaflet #2958, September 1979

2. Pruning Landscape Trees, University of California, Cooperative Extension Leaflet #2574, January 1979.

C. Work Force:

1. Experience: The landscape establishment firm foreman assigned to the job shall have a minimum of four years experience in landscape establishment supervision, with experience or training in (turf management), entomology, pest control, soils, fertilizers and plant identification.
2. Labor Force: The landscape establishment firm's labor force shall be thoroughly familiar and trained in the work to be accomplished and perform the task in a competent, efficient manner acceptable to the Owner.
3. Supervision: The foreman shall directly employ and supervise the work force at all times. Notify the Owner of all changes in supervision.

1.04 SCHEDULING

A. Scheduling:

1. Perform all establishment during hours agreed upon between Owner and Contractor.
2. Work force shall be present at the project site as often as necessary to perform specified establishment in accordance with the approved establishment schedule.

1.05 PROJECT CONDITIONS

- A. Site Visit: At beginning of establishment period, visit and walk the site with the Owner's representative to clarify the scope of work and understand existing project/site conditions.
- B. Documentation of Conditions: Document general conditions of existing trees, shrubs, vines, groundcovers and lawn recording all plant materials which are damaged or dying, if any.
- C. Irrigation System: Document general condition of existing irrigation system, making sure that faulty electrical controllers, broken and inoperable sprinkler heads (or emitters) are reported.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MAUNFACTURERS

A. Fertilizers:

Sierra Chemical Company  
1001 Yosemite Drive  
Milpitas CA 95035  
(408) 263-8080

"Gro-Power"  
Southern California Organic Fertilizer Company  
El Monte CA 91734-0907  
(714) 750-3830

W.R. Grace and Company

Agricultural Chemicals Group  
Memphis, Tennessee 38101

BFC Chemicals, Inc.  
Wilmington, Delaware 19805

B. Herbicides:

Chevron Chemical Company  
575 Market Street  
San Francisco CA 94105  
(415) 894-0880

Rhone-Poulenc Chemical Company  
Agro Chemical Division  
P.O. Box 125  
Mon Mouth Junction NJ 08852  
(201) 297-0100

Ciba-Geigy Corporation  
Agricultural Division  
P.O. Box 1830  
Greensboro NC 27419  
(919) 292-7100

Elanco Products Company  
740 S. Alabama St.  
Indianapolis IN 46285  
(317) 261-3638

The DOW Chemical Company  
P.O. Box 1706  
Midland MI 48640  
(517) 636-0236

3M Company-Agri Chemicals Project  
3M Center, Bldg. 223-6SE  
St. Paul MN 55144  
(317) 261-3000

2.02 MATERIALS

- A. Materials, General: All materials and equipment, unless otherwise indicated, shall be provided by the Contractor.
- B. Water: Furnished and paid for by the Owner.
- C. Fertilizers:
  - 1. Tightly compressed, slow-release and long-lasting complete fertilizer tablets bearing manufacturers label of guaranteed analysis of chemicals present.
  - 2. Balanced, once-a-season application controlled-released fertilizers with a blend of coated prills, which supply controlled-release nitrogen, phosphorus and potassium, and uncoated, rapidly soluble prills containing nitrogen and phosphorus.

3. Top Dress Fertilizer: "Gro-Power"
- D. Herbicides, Insecticides, and Fungicides:
  1. Obtain best quality materials with original manufacturers' containers, properly labeled with guaranteed analysis.
  2. Use non-staining materials.
- E. Lawn Seed for Reseeding: Match lawn mix.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Duration: Continuously maintain each plant and each portion of lawn and groundcover area after installation, during progress of Work and period of time specified after completion of all planting work until Final Acceptance.
- B. Protection:
  1. Protect all planting areas from damage of all kinds from beginning of work until Final Acceptance.
  2. Establishment includes temporary protection fences, barriers and signs as required for protection.
- C. Replacements:
  1. Immediately treat or replace all plants that become damaged or injured, as directed by Architect (Landscape Architect) through Owner's Representative, at no change in Contract Time and Contract Sum.
  2. Replacement plants shall be of a size, condition and variety acceptable to Architect (Landscape Architect).

#### 3.02 TREES, SHRUBS AND VINES

- A. Watering Basins:
  1. Maintain all watering basins around plants so that enough water can be applied to establish moisture through major root zones.
  2. For supplemental hand watering of watering basins, use a water wand to break the water force. Do not permit crown roots to become exposed to air through dislodging of soil and mulch.
  3. Maintain originally called for depth of mulch to reduce evaporation and frequency of watering.
  4. Check for moisture penetration throughout the root zone at least once per week.
- B. Resetting: Reset plants to proper grades or upright position.
- C. Weed Control:



1. Control weeds, preferably with pre-emergent herbicides and with selective systemic herbicides.
2. All areas between plants, including watering basins, shall be weed free.
3. Use only recommended and legally approved herbicides to control weed growth.
4. Avoid frequent soil cultivation that destroys shallow roots and breaks the seal of pre-emergent herbicides.

D. Pruning:

1. Prune trees to select and develop permanent scaffold branches that are similar in diameter than the trunk or branch to which they are attached, and which have vertical spacing of 18 inches to 48 inches and radial orientation so as not to overlay one another.
2. Prune trees to eliminate diseased or damaged growth, and narrow V-shaped branch forks that lack strength. Reduce toppling and wind damage by thinning out crowns.
3. Prune trees to maintain growth within space limitations, maintaining a natural appearance and balancing crown with roots.
4. No stripping of lower branches (“raising up”) of young trees will be permitted.
5. Retain lower branches in a “tipped back” or pinched condition to promote caliper trunk growth (tapered trunk). Do not cut back to fewer than six buds or leaves on such branches. Only cut lower branches flush with the trunk after the tree is able to stand erect without staking or other support.
6. Thin out and shape evergreen trees when necessary to prevent wind and storm damage. Do primary pruning of deciduous trees during the dormant season. Do not permit any pruning of trees prone to excessive “bleeding” during growth season.
7. Prune damaged trees or those that constitute health or safety hazards at any time of year as required.
8. Make all cuts clean and close to the trunk, without cutting into the branch collar. “Stubbing” will not be permitted. Cut smaller branches flush with trunk or lateral branch. Make larger cuts (1 inch in diameter or larger) parallel to shoulder rings, with the top edge of the cut at the trunk or lateral branch.
9. Branches too heavy to handle shall be pre-cut in three stages to prevent splitting or peeling of bark. Make the first two cuts 18 inches or more from the trunk to remove the branch. Make the third cut at the trunk to remove the resulting stub.
10. Do not prune or clip shrubs into balled or boxed forms unless specifically called for by design.
11. Clip shrubs to be hedged when branches project 2 inches beyond limit if clipped hedge shown on the Drawings.

E. Staking and Guying of Trees:

1. Inspect stakes and guys at least one a month to check for rubbing that causes bark wounds.
2. Conform to the recommended procedures of staking and guying as outlined in the University of California Publication AXT-331, “Staking Landscape Trees.”

F. Establishment of Existing Trees and Shrubs:

1. General: Conform to all applicable paragraphs regarding pruning, watering, spraying and fertilizing of new plant materials as specified in this section.
2. Be alert to symptoms of construction damage to root systems of existing trees and shrubs as evidenced by wilting, unseasonable or early flowering or loss of leaves, and insect or disease infestation due to declining vigor.
3. Notify the Landscape Architect in writing of all evidence of declining tree or shrub vigor immediately upon discerning the problem. Take appropriate interim measures to migrate the severity of the problem as specified in this section.
4. Submit written proposal and cost estimate for the correction of all conditions before proceeding with permanent correction work.

3.03 GROUNDCOVERS

A. Watering:

1. Check for moisture penetration throughout the root zone at least twice a month.
2. Water as frequently as necessary to maintain healthy growth of groundcovers.

B. Weed Control:

1. Control weeds, preferably with pre-emergent herbicides and with selective systemic herbicides.
2. Minimize hoeing of weeds in order to avoid plant damage.

3.04 LAWNS

A. Watering:

1. Water lawns at such frequency as weather conditions require, to replenish soil moisture to 6 inches below root zone.
2. Water at night if irrigation system is electrically controlled. Otherwise, watering shall be done during the early mornings.

B. Weed Control:

1. Control broadleaf weeds with selective herbicides.
2. In areas where crabgrass has infested the lawn, apply a selective post-emergent herbicide as soon as possible, and prior to flowering.
3. Apply pre-emergent herbicides such as Dacthal, Balan, or Betssan prior to crabgrass germination.
4. Do not irrigate for 48 hours after application of all herbicide sprays.
5. Coordinate application of herbicides with thatch control and reseeding schedule as described below.

C. Mowing and Edging:

1. Mow lawns when they reach 2 inches high.
  2. Trim edges at least two times per month or as required for neat appearance. Edging shall be performed with a blade type mechanical edger, shovel, or herbicide, String whips shall not be permitted. Vacuum clippings.
  3. A grass free clear space (edge) of eight (8") inches in width shall outline all trees and two (2") inches in width shall outline all obstacles.
- D. Top Dress Fertilizer: Applied 45 and 90 days after hydro-seeding.
1. Preparation: Immediately prior to top-dress application cut lawn and remove clippings.
  2. Application: Per 1000 square feet, apply fertilizer at following rates:

	<u>45 Days</u>	<u>180 Days</u>
Gro-Power 5-3-1	25 lbs.	---
Gro-Power 12-8-8	---	10 lbs.

- E. Reseeding of Lawn Areas: Match existing seed mix of adjacent areas.

### 3.05 IRRIGATION SYSTEM

A. General:

1. Repair without charge to Owner all damages to system caused by Contractor's operations. Perform all repairs within one watering period.
2. Report promptly to Owner all accidental damage not resulting from Contractor's negligence or operations.

B. Cleaning and Monitoring the System:

1. Continually monitor the irrigation systems to verify that they are functioning properly as designed. Make program adjustments required by changing field conditions.
2. Clean pump filter and strainer once a year and as often as necessary to keep irrigation systems free of sand and other debris.
3. Prevent spraying in windows, building walls, (game courts) by balancing the throttle control on the remote control valves and the adjustment screws on the sprinkler heads. Do not allow water to atomize and drift.

### 3.06 ESTABLISHMENT PERIOD

- A. Preliminary Review: As soon as all plantings are completes per Contract Docuemnts, hold a preliminary review to determine the condition of the work.
- B. Date of Review: Submit a written request to the Architect at least five (5) working days prior to anticipated date of review.

- C. Beginning of Establishment Period: The date on which the Architect issues a letter of preliminary Acceptance (Substantial Completion) to the Contractor.

### 3.07 FINAL ACCEPTANCE

#### A. Acceptance:

1. Work will be accepted by the Architect upon satisfactory completion of all work, including establishment period, but exclusive of replacement of materials under the correction period, according to the General Conditions of the Contract.
2. Submit a written request to Owner's Representative and Architect for review for Final Acceptance at least five (5) working days prior to anticipated Final Review date, which is at the end of the Establishment Period.

#### B. Corrective Work:

1. Work requiring corrective action or replacement in the judgment of the Architect shall be performed within ten (10) calendar days after the Final Review.
2. Perform corrective work and materials replacement in accordance with the drawings and specifications, and shall be made by the Contractor at no charge in contract time and contract sum.
3. After corrective work is completed, the Contractor shall again request a final review for final acceptance as outlined above.
4. Continue establishment of all landscaped areas until such time as all corrective measures have been completed and accepted.

#### C. Conditions for Acceptance of Work at End of Establishment Period:

1. Each plant shall be alive and thriving, showing signs of growth and no signs of stress, disease, or any other weaknesses.
2. All plants not meeting these conditions shall be replaced and a 90-day establishment period commenced for each plant.

- D. Final acceptance Date: The date on which the Architect issues a Letter of Final Acceptance. Upon Final Acceptance, the Owner will assume responsibility for establishment of the work.

### 3.08 WARRANTY PERIOD AND REPLACEMENTS OF PLANT MATERIALS

#### A. Specific Requirements: Refer to following sections:

1. Section 32 84 00 - Landscape and Irrigation Systems
2. Section 32 92 00 - Hydro-Seeding
3. Section 32 93 00 - Landscape Planting

### 3.09 CLEAN UP

- A. All areas shall be kept neat and orderly at all times. Debris from maintenance operations shall not be allowed to remain in excess of two hours. Remove all such debris from site at the end of each day.

END OF SECTION 32 97 00

SECTION 33 11 16 - SITE WATER DISTRIBUTION PIPING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with the Site Water Distribution Piping, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes but is not limited to:
  - 1. Water piping.
  - 2. Valves and valve boxes.
  - 3. Hydrants with valves.
  - 4. Lateral services extended to 5-feet from building.
  - 5. Connections of laterals to existing mains.
  - 6. Connection of building water system to laterals 5-feet from building.
  - 7. Testing and sterilization.
- C. Related Work Not in This Section:
  - 1. Section 31 23 33: Trenching and Backfilling.

1.02 SUBMITTALS

- A. Material List: Submit list of materials proposed for use accompanied by manufacturer's latest printed literature with technical data.
- B. Certificates: Manufacturer's certification that materials meet specified requirements.

1.03 QUALITY ASSURANCE

- A. Comply with the following codes and regulations:
  - 1. Plumbing code: Applicable portions of Uniform Plumbing Code pertaining to plumbing materials, construction, and installation of products.
  - 2. ANSI: Applicable American National Standards pertaining to products and installation of domestic water piping systems.
  - 3. American Water Works Association (AWWA) where noted.
  - 4. UL and FM: Provide valves used in fire protection piping, which are UL listed and FM approved.
  - 5. Greenbook Section 306.
  - 6. Local fire department regulations pertaining to fire protection systems.
- B. Manufacturers: Firms regularly engaged in manufacture of water piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- C. Inspection and Testing:
  - 1. Refer to Section 31 23 33, Trenching and Backfill for Compaction of Trenching.

1.04 RECORD DRAWINGS

- A. Provide complete record drawings showing dimensioned locations and depths of all piping, and exact locations of all accessories.

## PART 2 - PRODUCTS

### 2.01 PIPE

- A. Poly Vinyl Chloride (PVC) Plastic Pipe: Manufactured of material conforming to ASTM D1784, class 12454B, designated as PVC 1120 in ASTM D1795.
  - 1. Pipe 4 inches through 12 inches diameter: Pipe, couplings, and fittings 4 inch through 12 inch diameter shall conform to requirements of AWWA C900, Class 150, CIOD pipe dimensions only, elastomeric gasket joint only, unless otherwise indicated or specified.

### 2.02 FITTINGS AND SPECIALS

- A. For Poly Vinyl Chloride (PVC) Pipe:
  - 1. For Pipe 4 inch through 12 inch diameter: Fittings and specials shall be cast iron, bell end in accordance with AWWA C110, 150 psi pressure rating unless otherwise indicated or specified, except that profile of bell may have special dimensions as required by pipe manufacturer, or may be fittings and specials of same material as pipe with elastomeric gaskets, all in conformance with requirements of AWWA C900. Cast-iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with ANSI A21.4. Fittings shall be for bell and spigot pipe or plain end pipe, or as applicable.

### 2.03 JOINTS

- A. PVC Pipe: Joints for pipe, fittings and couplings for pipe shall match the specified pipe. Joints connecting pipe of differing materials shall be made in accordance with manufacturer's recommendation.

### 2.04 VALVES

- A. Gate valves shall be designed for a working pressure of not less than 150 psi and conform to AWWA C509. Valve connections shall be as required for piping in which they are installed. Valves shall have a clear waterway equal to full nominal diameter of valve, and shall be opened by turning counterclockwise. Operating nut or wheel shall have an arrow cast in the metal, indicating direction of opening.
  - 1. Valves 3 inches and larger shall be iron body, bronze mounted, and shall conform to AWWA C500. Flanges shall not be buried. An approved pit shall be provided for all flanged connections.
  - 2. Cast iron wedge shall have sealing surfaces of the wedge permanently bonded with resilient material to meet ASTM tests for rubber to metal bond ASTM D429. All body bolts shall be type 316, stainless steel. Valves shall be Mueller "RS" or equal. All underground valves shall be NS and all above ground valves shall be OS&Y.
- B. Check valves: Swing type spring loaded, 200 psig working pressure, seat readily and tightly with the face of the closure elements made of a non-corrodible material such as bronze composition conforming to ASTM B62.
- C. Valve Boxes: Valve boxes shall be cast iron or concrete, except that concrete boxes may be installed only in locations not subjected to vehicular traffic. Cast-iron boxes shall be extension type with slide-

type adjustment and with flared base. Minimum thickness of metal shall be 3/16 inch. Concrete boxes shall be standard product of a manufacturer of precast concrete equipment. Word "WATER" shall be cast in cover. Boxes shall be of such length as will be adapted, without full extension, to depth of cover required over pipe at valve location. The valve box and the installation of the gate valve shall conform to AWWA C509.

## 2.05 FIRE HYDRANTS AND APPURTENANCES

- A. Fire hydrants: Conforming to AWWA Specifications C503, wet barrel design, equipped with a 6" flange inlet connection, two 2-1/2" outlet and a 4" suction outlet with National Standard thread. Provide 6" diameter bury, with joint to match pipe joints. The extension piece of the hydrant shall be of such length that the hydrant barrel bottom flange or top hydrant bury shall be 3" above the top of the sidewalk or curb grade. Apply two coats of paint (OSHA "Yellow" #633). The outlets of all fire hydrants, including operating nuts and threads, shall be as approved by the serving fire department. Apply a field coat of paint to all hydrants after installation.
- B. Post indicators: U.L. approved type.
- C. Tracer Wire for Non-Metallic Piping: Tracer wire shall be bare copper or aluminum wire not less than 0.10 inch in diameter and shall be provided in sufficient length to be continuous over all runs of non-metallic piping.
- D. Pipe bedding and backfill shall conform to requirements of Subsections 306-1.2 and 306-1.3 of the Standard Specifications.
- E. Thrust blocks: Portland cement concrete conforming to requirements of Section 03 31 13.

## PART 3 – EXECUTION

### 3.01 TRENCH EXCAVATION

- A. Perform all excavation for the construction of trenches and all additional excavation required for structures forming a part of the pipeline. Trench excavation shall conform to the requirements of Section 31 23 16 of Standard Specifications.
- B. Trenches shall be inspected by the Soils Engineer before proceeding with the work.

### 3.02 INSTALLATION OF PIPE

- A. Handling: Pipe and accessories shall be handled to insure delivery to trench in sound, undamaged condition. Particular care shall be taken not to injure pipe coating or lining. If coating or lining of any pipe or fitting is damaged, repair shall be made by Contractor at his expense in a satisfactory manner. No other pipe or material of any kind shall be placed inside a pipe or fitting after coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on bare ends of pipe, Interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, pipe shall be examined for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Owner. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place. Poly vinyl chloride pipe and fittings shall be handled and stored in accordance with manufacturer's recommendations.
- B. Cutting of Pipe: Cutting of pipe shall be done in a neat and workmanlike manner without damage to pipe. Unless otherwise recommended by manufacturer, cutting shall be done with an approved-type



mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed.

- C. Sewer and Irrigation Lines: Where location of water pipe is not clearly defined in dimensions on drawings, water pipe shall not be laid closer horizontally than 10'-0" clear from a sewer or irrigation line except where bottom of water pipe will be at least 12 inches above top of sewer or irrigation pipe, in which case water pipe shall not be laid closer horizontally than 6'-0" from sewer or irrigation. Where water lines cross under gravity flow sewer lines, sewer pipe for a distance of at least 10'-0" each side of crossing shall be fully encased on concrete or shall be made of pressure pipe with no joint located within 3'-0" horizontally of crossing.
- D. Joint Deflection:
1. Flexible Plastic Pipe: Maximum offset in alignment between adjacent pipe joints shall be recommended by manufacturer, but in no case shall it exceed 5 degrees.
- E. Placing and Laying:
1. Pipe and accessories shall be carefully lowered into trench by means of derrick, ropes, belt slings, or other authorized equipment. Under no circumstances shall any of water-line materials be dropped or dumped into trench, care shall be taken to avoid abrasion of pipe coating. Except where necessary in making connections with other lines, pipe shall be laid with bells facing in direction of laying. Full length of each section of pipe shall rest solidly upon pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for work. Water shall be kept out of trench until jointing is completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter pipes or fittings. Where any part of coating or lining is damaged, repair shall be made by Contractor at his expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored, as indicated.
  2. PVC shall be installed in accordance with AWWA M23.
- F. Jointing:
1. PVC Pipe: Pipe 4 inch through 12 inch diameter shall have elastomeric gasket joints as specified in AWWA C900. Jointing procedure shall be as specified for pipe less than 4 inch diameter with configuration utilizing elastomeric ring gasket.
  2. Connections between different types of pipe and accessories shall be made with transition fittings approved by the Owner.
- G. Service Lines: Service lines shall include pipeline connecting building piping to water distribution lines at a point approximately 5'-0" outside building. All valves shall be provided with extension service boxes of lengths required. Service lines shall be constructed in accordance with following requirements:
1. Service lines 2 inches in size shall have a gate valve.
  2. Service lines larger than 2 inches shall be connected to main by a rigid connection and shall have a gate valve.

### 3.03 SETTING OF FIRE HYDRANTS AND VALVES AND VALVE BOXES

- A. Fire hydrants shall be located and installed as indicated. Each hydrant shall be connected to main with a 6 inch branch line, unless otherwise shown, having at least as much cover as distribution main. Hydrants shall be set plumb with pumper nozzle facing roadway and with center of lowest outlet not less than 18 inches above finished surrounding grade, and operating nut not more than 48 inches above finished surrounding grade. Hydrant shall be set upon a slab or concrete not less than 4 inches thick and 15 inches square. Concrete thrust blocks shall be installed at all fire hydrants as shown on drawings.
- B. Valves and valve boxes shall be installed where indicated or specified and shall be set plumb. Valve boxes shall be centered on valves. Boxes shall be installed over each outside gate valve unless otherwise indicated. Earth fill shall be carefully tamped around each valve box to undisturbed trench face.
- C. Valves and hydrants after delivery shall be drained to prevent freezing and shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and hydrant or valve shall be fully opened and fully closed to insure that all parts are in working condition.

3.04 THRUST BLOCKS

- A. Plugs, caps, tees and bends of deflecting 22-1/2 degrees or more, either vertically or horizontally, on water lines 6 inches in diameter or larger, and fire hydrants shall be provided with thrust blocking, or metal tie rods and clamps or lugs, as directed. Valves shall be securely anchored or shall be provided with thrust blocking to prevent movement. Thrust blocking shall be concrete of a mix not leaner than 1 cement: 2-1/2 sand: 5 gravel, and having a compressive strength of not less than 2,000 psi after 28 days. Blocking shall be placed between solid ground and hydrant or fitting to be anchored. Unless otherwise indicated or directed, base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. Sides of thrust blocks not subject to thrust may be poured against forms. Area of bearing shall be as indicated or as directed. Blocking shall be placed so that fitting joints will be accessible for repair. Steel rods and clamps shall be protected by galvanizing or by coating with bituminous paint.
- B. The area of the thrust blocks shall conform to the following table:

Size	Fitting	Area
10 inch	90 degree ell	13.68 square feet
	45 degree ell	7.41 square feet
	Valves, tees, dead ends	9.68 square feet
8 inch	90 degree ell	9.10 square feet
	45 degree ell	4.92 square feet
	Valves, tees, dead ends	6.43 square feet
6 inch	90 degree ell	5.29 square feet
	45 degree ell	2.86 square feet
	Valves, tees, dead ends	3.74 square feet

3.05 HYDROSTATIC TEST

- A. Where any section of a water line is provided with concrete thrust blocking for fitting or hydrants, hydrostatic tests shall not be made until at least five (5) days after installation of concrete thrust blocking unless otherwise approved. Method proposed for disposal of waste water from hydrostatic tests and disaffection shall be submitted to the Architect for approval prior to performing hydrostatic tests.

- B. Pressure Tests: After pipe is laid, joints completed, fire hydrants permanently installed, and trench partially backfilled leaving joints exposed for examination, newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for one hour to a hydrostatic pressure test of 200 psi. Each valve shall be opened and closed several times during test. Exposed pipe, joints, fittings, hydrants, and valves shall be carefully examined during partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants, and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and test shall be repeated until test results are satisfactory. Piping and specials requiring replacement disclosed by hydrostatic tests and all work connected therewith shall be at Contractor's expense.
- C. Leakage Test: Leakage test shall be conducted after pressure tests have been satisfactorily completed. Duration of each leakage test shall be at least two hours; and during test, water line shall be subjected to 200 psi pressure. Leakage is defined as quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof necessary to maintain specified leakage test pressure after pipe has been filled with water and the air expelled. No piping installation will be accepted until leakage is less than number of gallons per hour as determined by formula:

$$L = 0.000135 \text{ IND } (P \text{ raised to } \frac{1}{2} \text{ power}) \text{ for all pipe materials.}$$

1. In which L equals allowable leakage in gallons per hour; N is number of joints in length of pipeline tested; D is nominal diameter of pipe in inches; and P is average test pressure during leakage test, in psi gauge.
  2. If any test of pipe discloses leakage greater than that specified in foregoing table, defective joints shall be located and repaired until leakage is within specified allowance.
- D. Time for Making Test: Except for joint material setting or where concrete reaction backing necessitates a five day delay, pipelines jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by manufacturer before being subjected to pressure test and subsequent leakage test.
- E. Concurrent Hydrostatic Tests: Contractor may elect to conduct hydrostatic tests using either or both of the following procedures. Regardless of sequence of tests employed, results of pressure tests, leakage tests, and disinfection shall be satisfactory as specified. All replacement, repair, or retesting required shall be accomplished by Contractor.
1. Pressure test and leakage test may be conducted concurrently.
  2. Hydrostatic tests disinfection may be conducted concurrently, using water treated for disinfection to accomplish hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of unit, disinfection shall be reaccomplished.

### 3.06 DISINFECTION

- A. Before acceptance of potable water operation, each unit of completed water line shall be disinfected as prescribed by AWWA C651 and Section 22 00 00, Paragraph 3.12 – Sterilization. Unit will not be accepted until satisfactory bacteriological results have been obtained. The system shall not be connected to CSA 64's facilities prior to disinfection and acceptance by the General Manager of CSA 64.

### 3.07 CLEANING

- A. At all times, maintain premises free from accumulation of debris, waste materials, unusable materials, together with excess equipment, tools and other implements of service resulting from work of this section.
- B. Debris, waste, or unused construction materials shall not be used for fill or backfill.

END OF SECTION 33 11 16

SECTION 33 31 00 SANITARY SEWERAGE PIPING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of work: The work under this section includes furnishing all labor, materials, and equipment, and performing all operations in connection with Sanitary Sewerage Piping, as indicated on the drawings, specified herein, or reasonably required to complete the work. The work includes, but is not limited to the following:
  - 1. Sanitary sewer work as follows:
    - a. Sanitary sewer pipe and fittings.
    - b. Lateral services extended to 5-feet from building.
    - c. Connections of laterals to existing mains or municipal sewer system.
    - d. Connection of building sewer system to laterals 5-feet from building.
- C. Related Section:
  - 1. Section 31 23 33: Trenching and Backfilling

1.02 SUBMITTALS

- A. Layout Drawings: Submit drawings for layout of piping systems. Indicate locations of fittings and other accessories on layout drawings; detail cleanouts. Do not deliver pipe, fittings, and accessories until layout drawings have been approved.
- B. Manufacturer's Data: Submit manufacturer's standard drawings or catalog cuts of the following items:
  - 1. Fittings.
  - 2. Joints and couplings.
  - 3. Piping.
- C. Standards Compliance: Submit manufacturer's certificates of conformance or compliance for each of the following materials which are specified to conform to publications referenced under paragraph "Materials" in this section:
  - 1. Pipe and fittings, including factory-applied linings.
  - 2. Pipe joint materials.

1.03 QUALITY ASSURANCE

- A. All tests required by the applicable referenced publications shall have been performed, whether specified in that publication to be mandatory or otherwise. For tests which are not specified in the referenced publication to be performed at definite intervals, during manufacture, the tests shall have been performed within three years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.04 RECORD DRAWINGS

- A. Provide complete record drawings showing dimensioned locations and depths of all piping, and exact locations of all accessories.

1.05 INSPECTION AND TESTING

- A. Inspection: Soils engineer will inspect and test the backfilling work of this section. Notify soils engineer prior to commencement of work.
- B. Testing: Soils engineer will make tests to determine degree of compaction in accordance with Section 31 23 33, Trenching and Backfilling.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Sewer pipe shall be polyvinyl chloride (PVC) plastic pipe, as indicated on the drawings.

2.02 MATERIALS

A. Pipe and Fittings:

- 1. PVC Plastic Piping: Conform to ASTM D3033 or D3034, shall be SDR 35, with ends suitable for elastomeric gasket joints.

B. Pipe jointing materials:

- 1. For polyvinyl chloride plastic piping: Joints shall conform to ASTM D3212. Gaskets shall conform to ASTM F477.

C. Cleanouts: In accordance with the drawings, of the sizes and at locations indicated. Cleanouts shall be iron body type with extra heavy bronze plugs. Cleanouts shall be as manufactured by Acorn Engineering Co., J.R. Smith Mfg. Co., or F.A. Zurn Mfg. Co., as follows:

- 1. Areas Surfaced with Concrete: Acorn No. 120-11, Smith No. 4240, or Zurn Z-1326-10 with non-skid polished nickel bronze cover set flush with surface.
- 2. Area Surfaced with Asphaltic Concrete Paving and Non-Surfaced Areas: Acorn No. 120-10, Smith No. 4240, or Zurn Z-1326-10 with extra heavy cast iron non-skid cover.

D. Yard boxes shall be concrete, approximately 12 inches wide, 18 inches long, and 12 inches deep or larger (outside dimensions) as required. Covers for yard boxes in paved areas shall be checkered cast iron covers. Other covers shall be plain concrete covers.

2.03 PIPE JOINTS

- A. As specified by manufacturer.

### PART 3 - EXECUTION

#### 3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Location of Piping: Where the location of the sewer is not clearly defined by dimensions on the drawings, lay sewer line not closer horizontally than 10 feet from a water main or service line. Where sanitary sewer lines pass above water lines, encase sewer in concrete for a distance of 10 feet on each side of the crossing, or substitute rubber-gasketed pressure pipe for the pipe being used for the same distance. Where sanitary sewer lines pass below water lines, lay pipe so that no joint in the sewer line will be closer than 3 feet, horizontal distance, to the water line. Install a continuous length of tracer wire for the full length of nonmetallic pressure pipe. Attach wire to top of pipe in such a manner that it will not be displaced during construction operations.
- B. Survey Line and Grade: Grade controls and survey lines shall be provided by a licensed land surveyor obtained by the Contractor.
- C. Pipe Laying and Jointing: Each pipe and fitting will be inspected before and after installation and those found defective will be rejected. Provide proper facilities for lowering sections of pipe into trenches. Lay non-pressure pipe with the bell or groove ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots or tongues and grooves will not be permitted. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper caulking or installation of joint material. At the end of each day's work, close open ends of pipe temporarily with wood blocks or bulkheads.
- D. Connections to Existing Lines: Make connections to existing lines in an approved manner. Conduct work so that there is minimum interruption of service to existing line.

#### 3.02 EXCAVATION AND TRENCHING

- A. Perform necessary trenching, excavation, shoring, and backfilling required for proper laying of pipe lines in accordance with Section 31 23 33. Trenching and Backfilling. Bottoms of trenches shall be cut to grade, and bell holes shall be excavated to insure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.

#### 3.03 INSTALLATION OF PIPE

- A. Construct pipe lines of full length sections of pipe specified. Short sections allowed only when run requires less than one full length of pipe.
- B. Install horizontal sewer and drainage pipe to a uniform grade between elevations indicated on the drawings or 1/4 inch per foot minimum where not indicated.
- C. Sewer lines shall be installed prior to the installation of any other utility lines within the area.
- D. Sewer pipe shall be constructed beginning at the lowest point of connection or discharge, and laying the pipe continuously upstream. Lay bell and spigot pipe with the bell end upstream.

#### 3.04 SPECIAL REQUIREMENTS FOR INSTALLATION OF PVC PLASTIC PIPING

- A. Install pipe and fittings in accordance with the general requirements for installation of pipelines and with the requirements of UNI-B-5 for laying and joining pipe and fittings.

- B. Make joints with the gaskets previously specified for joints with this piping; assemble these joints in accordance with the requirements of UNI-B-5 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

### 3.05 INSTALLATION OF CLEANOUTS

- A. Install cleanouts at all locations where shown on drawings. Cleanouts in lines up to and including 8 inches shall be the same size as the pipeline. In lines larger than 8 inches, use an 8 inch riser.
- B. After lines are tested and approved, each cleanout plug shall be removed, coated with approved emulsified lead paste, and replaced so as to be gas and water tight.

### 3.06 YARD BOXES

- A. Provide yard boxes for all cleanouts except in concrete paved areas. Yard boxes shall be set flush with finished grade. A 4-inch thick concrete pad shall be poured under all yard boxes.

### 3.07 BACKFILL AND COMPACTION

- A. Perform in accordance with requirements of Section 31 23 33, Trenching and Backfilling, and with Section 306-1.3 of the Greenbook. In backfilling the trench, take all necessary precautions to protect the pipe from damage or shifting.

### 3.08 CONNECTIONS TO EXISTING MAINS

- A. Where connections are made between new work and existing mains, the connections shall be made by using special couplings, Rockwell Clamp and Coupling-Tapping Sleeves, and other fittings to suit the on-site conditions. Methods of connections to existing mains shall be as required by local codes.

### 3.09 FIELD TESTS AND SURVEYS

- A. General: Conduct field tests in presence of Architect, as specified herein.
  - 1. Pipelines: Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line.
    - a. Leakage Tests: Test lines for leakage by exfiltration test. Fill the line to be tested with water so that the head will be at least 4 feet above top of pipe at upper end of pipeline section being tested. Allow filled pipeline to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, re-establish the head and measure amount of water needed to maintain this water level during a two-hour test period. Amount of leakage, as measured by either infiltration or exfiltration test shall not exceed 0.2 gallon per inch of diameter per hour per 100 feet of pipeline. When leakage exceeds the amount specified, make satisfactory correction and retest pipeline section in the same manner as previously specified. Correct all visible leaks regardless of leakage test results.
    - b. Deflection Testing: Make a deflection test an entire length of installed plastic pipeline on completion of all work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads. Deflection of pipe in the installed pipeline under all external loads shall not exceed 4.5 percent of the normal inside diameter of pipe. Testing may be by either pull-through device or deflection measuring device.
- B. Provide verification survey for complete pipeline, manholes and accessories. Show locations of lines, invert elevations, and locations of manholes.



3.10 CLEANUP

- A. Upon completion of work, leave the site clean and clear of debris and construction materials.

END OF SECTION 33 31 00

SECTION 33 51 13 – NATURAL GAS PIPING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of General Conditions, Supplementary Conditions, and Division One apply to this section.
- B. Scope of Work: The work under this section includes furnishing all labor, materials, and equipment and performing all operations in connection with the Gas Distribution System, as indicated on the drawings, specified herein, or reasonably required to complete the work.
- C. Section includes gas system from point of connection to existing distribution and connection systems to 5' outside of building.
- D. Install Gas main in Cross and Fonzie Streets as shown on plans. Run lateral to campus meter. Meter to be set by Gas Company.
- E. Related Sections:
  - 1. Trenching and Backfill: Section 33 51 13.

1.02 REFERENCES

- A. ANSI Code Compliance: Comply with applicable provisions of ANSI B31.2, "Fuel Gas Piping".
- B. NFPA Compliance: Fabricate and install natural gas systems in accordance with NFPA 54, "National Fuel Gas Code".
- C. ASTM D3350, Polyethylene Plastics Pipe and Fittings Materials.
- D. ASTM D2513, Polyethylene Pipe.
- E. ASTM D2513 or ASTM D2683, Fittings, Socket Type.
- F. UMC Compliance: Fabricate and install natural gas systems in accordance with IAPMO, "Uniform Plumbing Code".
- G. Local Utility Compliance: Comply with requirements of local gas utility company.
- H. Manufacturers: Firms regularly engaged in manufacture of natural gas piping products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for natural gas systems materials and products.
- B. Certificates: Manufacturers' certification that materials meet specified requirements.

1.04 PRODUCT HANDLING

- A. Pipe and components shall be handled carefully to ensure sound, undamaged condition. Plastic pipe shall be handled in conformance with AGA Plastic Pipe Manual for Gas Service.

#### 1.05 RECORD DRAWINGS

- A. Provide complete record drawings showing dimensioned locations and depths of piping, and exact locations of accessories.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Polyethylene Pipe: ASTM D3350, ASTM D2513, ASTM 02683 and ASTM 3261, pipe designations PE 2306 and PE 3406, designed for gas distribution.
- B. Gas Cocks:
  - 1. Up to 2 inches: Bronze body, bronze tapered plug, non lubricated, Teflon packing, threaded ends.
  - 2. Over 2 inches: Cast iron body, and plug, non-lubricated, Teflon packing, flanged ends.
- C. Valve Boxes: Cast iron not less than 3/16 inch thick, with word "GAS" cast in box cover. Boxes shall be adjustable extension-type with screw or slide-type adjustments.

### PART 3 – EXECUTION

#### 3.01 EXCAVATION AND TRENCHING

- A. Perform trenching, excavation, shoring, and backfilling required for proper laying of pipe lines in accordance with Section 33 23 33. Bottoms of trenches shall be cut to grade to ensure pipes are bearing for their entire length.

#### 3.02 INSTALLATION OF PIPE

- A. General:
  - 1. Gas service shall be constructed from gas main or meter to point of delivery within 5 feet of building. Service lines shall be connected to gas main or meter as indicated. Where indicated, service line shall be provided with a shutoff plug valve of same size as service line.
    - a. Service lines shall be as short and as straight as practicable between point of delivery and gas main and shall not be bent or curved laterally unless necessary to avoid obstructions or otherwise permitted.
    - b. Service lines shall be laid with as few joints as practicable using standard lengths of pipe. Shorter lengths shall be used only for closures.
  - 2. Installation of gas lines shall be in conformance with ANSI B31.8.
- B. Installing Pipe Underground: Service lines shall be installed to grades indicated. Where trench has been excavated below pipe grade, trench shall be backfilled with suitable material and thoroughly tamped to provide full-length bearing. Laying pipe on blocks to produce uniform grade will not be permitted.

1. Pipe shall be clean inside before it is lowered into trench and shall be kept, free of water, soil, and all other foreign matter that might injure or obstruct operation of valves, regulators, meters, or other equipment. When work is not in progress, open ends of pipe or fittings shall be securely closed by expandable plugs or other suitable means.
2. Minor changes in line or gradient of pipe that can be accomplished through natural flexibility of pipe material without producing permanent deformation and without over stressing joints may be made when approved. Changes in line or gradient that exceed limitations specified shall be made with fittings specified.

### 3.03 PIPE JOINTS

- A. Joints in Plastic Pipe: Solvent cement, heat fusion, adhesive, and mechanical coupling joints shall conform to ANSI B31.8 and AGA, Plastic Pipe Manual for Gas Service. Solvent cements shall conform to ASTM D2513.

### 3.04 INSTALLATION OF VALVE BOXES

- A. Valve boxes shall be installed at each underground valve except where concrete or other type of housing is indicated. When valve is located in a roadway, valve box shall be protected against movement by a suitable concrete slab at least 3'-0" square. When installed in concrete walks, top of box shall be in a concrete slab 2'-0" square and set flush with concrete.

### 3.05 DRIPS

- A. Drips shall be installed at locations where indicated. Drips shall conform to details indicated or may be commercial units of approved type and capacity. A blow-off pipe 1-1/4" or larger shall be connected to each drip at its lowest point and shall extend to or near ground surface at a convenient location away from traffic.
- B. Discharge terminal shall be provided with a reducing fitting, a plug valve, and a 1/2" nipple turned down. Discharge terminal shall be inside a length of 12" or larger vitrified clay pipe or concrete sewer pipe, set vertically on a bed of coarse gravel 1'-0" thick and 3'-0" square, and closed at ground surface with a suitable replacement cover.

### 3.06 CONNECTION TO EXISTING LINES

- A. Connections between new work and existing gas lines shall be made in accordance with ANSI B31.8 using proper fittings to suit actual conditions. When connections are made by tapping into a gas main, connecting fitting shall be same size as pipe being connected. Connections of new underground service lines to existing steel mains shall be electrically continuous.

### 3.07 FIELD QUALITY CONTROL

- A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA-54 and Uniform Plumbing Code.

### 3.08 ADJUSTING AND CLEANING

- A. Cleaning and Inspecting: Clean and inspect natural gas systems.

### 3.09 SPARE PARTS

- B. Valve Wrenches: Furnish 2 valve wrenches for each type of gas valve installed.

END OF SECTION 33 51 13