Heber Public Utility District

HPUD RECREATION CENTER

Heber Public Utility District
1078 Dogwood Road, Suite 103
Heber, CA 92249
Office (760) 482-2440

Date: September 13, 2019

Funded by:

Heber Public Utility District and Imperial Irrigation District (IID)

A century of service.

Prepared by:

The Holt Group, Inc.
THG Project No. 744.077

REGISTERED PROFESSIONAL ENGINEER
JESUS R. MARMOLEJO
No. 80110
Exp. 03-31-21
CIVIL
STATE OF CALIFORNIA

CONTRACT DOCUMENTS AND SPECIFICATIONS
SEPTEMBER 13, 2019

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1. ADVERTISEMENT FOR BIDS

Heber Public Utility District
1078 Dogwood Road, Suite 103
Heber, CA 92249

Separate sealed BIDS for the construction of the **Heber Public Utility District – Recreation Center Project** will be received by **the Heber Public Utility District 1078 Dogwood Road, Suite 103, Heber, CA 92249** until **2:00 pm** (prevailing local time) on **Thursday, October 10, 2019,** and then at said office in the **Heber Public Utility District** will be publicly opened and read aloud.

Heber Public Utility District (HPUD) proposes to construct a Recreational Center within a HPUD owned lot (65 feet by 110 feet rectangular lot) located at 156 Littlefield Way, Heber, California. The construction project will include minor demolition, grading, and construction of a metal building to serve as the Recreational Center Building. The proposed metal building will be 40-feet by 40-feet (1,600 square feet) and will include a large main room with partitioned office, storage room, and restroom facilities. The contractor will be required to provide all of the building's design drawings and calculations to meet the current building code requirements. The contractor will be responsible for securement of the Building Permit through the County of Imperial's Planning and Development Services Department.

Copies of the Bidding Documents may be obtained at the office of **Heber Public Utility District located at 1078 Dogwood Road, suite 103, Heber, CA 92249; Phone Number (760)-482-2440** upon the nonrefundable payment of **$100.00** for each set. Prospective Bidders may examine the Bidding Documents at the **Heber Public Utility District** office on Mondays through Fridays between the hours of 8:00 am to 12:00 pm, and 1:00 pm to 4:30 pm; and the office of the Engineer, **The Holt Group, Inc, 1601 N. Imperial Avenue, El Centro, CA 92243; Phone (760)-337-3883**, on Mondays through Fridays between the hours of 8:00 am and 5:00 pm. Partial sets of Bidding Documents will not be available from the Issuing Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

A Prebid Conference for prospective Bidders will be held at the **Heber Public Utility District Office**, located at **1078 Dogwood Road, Heber, CA 92249** at **10:00 am** (prevailing local time), on **Wednesday, October 2, 2019.** This conference is to inform bidders, subcontractors, and suppliers of project requirements. Bidders attendance at this conference is not mandatory.

Prospective Bidders shall be licensed Contractors in the State of California and shall be skilled and regularly engaged in the general class or type of work called for under the Contract. Each Bidder shall have a Class A or Class B California Contractor's license.

All contractors and subcontractors who bid or work on a public works project must register and pay an annual fee to the State of California, Department of Industrial Relations (DIR) per SB 854. No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the DIR pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the DIR pursuant to Labor Code section 1725.5.

This is a Public Works Project subject to the rate of prevailing wages as established by the State of California DIR. This project is subject to compliance monitoring and enforcement by the DIR. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka California Division of Labor Standards Enforcement).

The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations and relevant orders of the Secretary of Labor.

__09-18-2019_____ _____Raquel R. Carrillo_____
(Date) Raquel R. Carrillo, Clerk of the Board

2. INSTRUCTIONS TO BIDDERS

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ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered: **Heber Public Utility District, 1078 Dogwood Road, Suite 103, Heber, CA 92249, P: (760) 482-2440.**

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in the number and for the payment, of **one hundred dollars ($100.00)** may be obtained from the Issuing Office. **The payment is nonrefundable**.

2.02 Complete sets of Bidding Documents must be purchased from ***Heber Public Utility District*** pursuant to the preparation of Bids. Neither the Owner nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 The Owner and the Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, within **five (5) days** of the Owner's request, the Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below. The bidder certifies that all statements and information are true and accurate.

ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

A. The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that the Engineer has used in preparing the Bidding Documents.

2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that the Engineer has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by the Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in paragraph 4.02 of the Supplementary Conditions. The Bidder is responsible for any interpretation or conclusion that the Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports as shown or indicated on such drawings.

4.02 *Underground Facilities*

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to the Owner and the Engineer by the Owners of such Underground Facilities, including the Owner, or others.

4.03 *Hazardous Environmental Condition*

A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that the Engineer has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by the Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which the Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. The Bidder is responsible for any interpretation or conclusion that the Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports as shown or indicated on such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at

the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the Scope of the Work appear in Paragraph 4.06 of the General Conditions.

4.05 On request, the Owner will provide the Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as the Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. The Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by the Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, the Owner will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.

4.07 It is responsibility of each Bidder before submitting a Bid to:

A. Examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda;

B. Visit the Site and become familiar with and satisfy the Bidder as to the general, local, and site conditions that may affect cost, progress, and performance of the Work;

C. Become familiar with and satisfy the Bidder as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, or performance of the Work;

D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;

E. Obtain and carefully study (or accept consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for the performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

G. Become aware of the general nature of the work to be performed by the Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. Correlate the information known to the Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

I. Promptly give the Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that the Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by the Engineer is acceptable to the Bidder; and

J. Determine that the Bidding Documents are generally sufficient to indicate and convey an understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that the Bidder has given the Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that the Bidder has discovered in Bidding Documents and the written resolutions thereof by the Engineer are acceptable to the Bidder, and that the Bidding Documents are generally sufficient to indicate and convey an understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

5.01 A **PreBid Conference** will be held at **10:00 am** on **Wednesday, October 2, 2019,** at the **Heber Public Utility District** office located at **1078 Dogwood Road, Heber, CA 92249.** Representatives of the Owner and the Engineer will be present to discuss the Project. Attendance is not mandatory. A site visit will immediately follow. The Engineer will transmit to all prospective Bidders of record such Addenda as the Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 - SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by the Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by the Contractor**.**

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Owner in writing. Interpretations or clarifications considered necessary by the Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the Owner as having received the Bidding Documents. Questions received less than **seven (7) days** prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by the Owner or the Engineer.

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by a Bid Security made payable to the Owner in an amount of **ten percent (10%)** of Bidder's maximum Bid price and in the form of a certified check or a Bid Bond (Contract Document Section 00430,) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

8.02 The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award,

whereupon the Bid Security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within **fifteen (15) days** after the Notice of Award, the Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid security of other Bidders whom the Owner believes to have a reasonable chance of receiving the award may be retained by the Owner until the earlier of **seven (7) days** after the Effective Date of the Agreement or **sixty-one (61) days** after the Bid Opening, whereupon the Bid Security furnished by such Bidders will be returned.

8.03 The Bid Security of other Bidders whom the Owner believes do not have a reasonable chance of receiving the award will be returned within **seven (7) days** after the Bid Opening.

ARTICLE 9 - CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 -LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or those substitute materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. No item of material or equipment will be considered by the Engineer as a substitute unless a written request for approval has been submitted by Bidder and has been received by the Engineer at least **fifteen (15) days** prior to the date for receipt of Bids. Each request shall conform to the requirements of Paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. The Engineer's decision of approval or disapproval of a proposed item will be final. If the Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to the Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within **five (5) days** after the Bid Opening, submit to the Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by the Owner. If the Owner or the Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, the Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

12.02 If the apparent Successful Bidder declines to make any such substitution, the Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid Security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which the Owner and the Engineer makes no written objection prior to the giving of the Notice of Award will be

deemed acceptable to the Owner and the Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.

12.03 The Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom the Contractor has reasonable objection.

12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in Supplement Conditions 6.06.

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer.

13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid shall be signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid From. A Bid price shall be indicated for each, *Bid Item, Deductive Alternate, and Unit Price Item* listed therein, or the words "No Bid", "No Change" or "Not Applicable".

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporation business address and state of incorporation shall be provided on the Bid Form.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The business address of the partnership shall be provided on the Bid Form.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the business address of the firm must be provided on the Bid Form.

13.06 A Bid by an individual shall show the Bidder's name and business address.

13.07 A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid form. The business address of the joint venture must be provided on the Bid Form.

13.08 All names shall be typed or printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers and dates of which shall be filled in on the Bid form.

13.10 The address and telephone number and email address for communication regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of the Bidder's authority and qualification to do business in the State of California. Bidder's state contractor license number for the state of the Project shall also be shown on the Bid Form. Bidders shall possess a valid State of California Contractors "A" or "B" License at the day and time of the opening of proposals. The license shall be valid during the contract period.

ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

14.01 Unit Price

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Schedule of Values.

B. The total of all bid prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The Final Quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in the favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

ARTICLE 15 - SUBMITTAL OF BID

15.01 With each copy of the Bidding Documents, a Bidder is furnished one (1) separate unbound copy of the Bid Form, and the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form.

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to Owner at the address in Article 1.01 of the Bid Form.

Project Title: Heber Public Utility District - HPUD Recreation Center

Owner's Address: 1078 Dogwood Road, Suite 103, Heber, CA 92249

ARTICLE 16 - MODIFICATION OR WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within **twenty-four (24) hours** after Bids are opened any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of the Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid Security will be returned. Thereafter, if the Work is rebid or negotiated, that Bidder will be disqualified from further bidding on the Work. This provision to withdraw a Bid without forfeiting the Bid Security does not apply to Bidder's errors in judgment in preparing the Bid.

ARTICLE 17 - OPENING OF BIDS

17.01 The Bids will be opened at the time and place indicated in the Advertisement for Bids and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the Bids and Deductive Alternates will be made available to the Bidders after the opening of the Bids.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form.

ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 The Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. The Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. The Owner may also reject the Bid of any Bidder if the Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. The Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one (1) Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating the Bids, the Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, the Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 The Owner may conduct such investigations as the Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 If the Contract is to be awarded, the Owner will award the Contract to the responsible Bidder who's Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, price and other factors considered. **The Award shall be made to the lowest responsive, responsible Bidder. The lowest responsive, responsible Bidder shall be determined by: (1) lowest overall cost to the owner, (2) evaluation of Bidder's experience and, (3) a Bidder's proposal that complies with all of the requirements prescribed in this document.**

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth the Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to the Owner, it must be accompanied by such bonds.

ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within **fifteen (15) days** thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. **Within ten (10) days thereafter, the Owner shall deliver one (1) fully signed counterpart to the Successful Bidder with five (5) complete sets of the "Issued for Construction" Drawings with appropriate identification.**

21.02 This Contract is expected to be funded in part with funds provided by the Heber Public Utility District. Refer to Article 18 of the General Conditions for information on the Federal Requirements.

21.03 Concurrence by HPUD in the award of the Contract is required before the Contract is effective.

ARTICLE 22 - SALES AND USE TAXES

22.01 Contractor shall pay all sales, use and other taxes as specified in Paragraph 6.10 of the General Conditions.

ARTICLE 23- WORKERS' COMPENSATION REQUIREMENTS

23.01 As required by Section 1860 of the California Labor Code and in accordance with the provisions of Section 3700 of the Labor Code, every Contractor will be required to secure the payment of workers' compensation to its employees.

23.02 In accordance with Section 1861 of the California Labor Code, the Contractor shall furnish the Owner with a statement as follows: "I am aware of the provisions of 3700 of the Labor Code which requires every employer to be insured against liability for worker's 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."

23.03 Notice is hereby given that, pursuant to 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each site.

ARTICLE 24 – SUBCONTRACTOR LISTING LAW

24.01 In accordance with Section 4104 of the California Public Contract Code, each Bidder, in his or her Bid, shall set forth the name and the location of the place of business of each Subcontractor who will perform Work or labor or render service to the prime Contractor in or about the construction of the Work or improvement, or a Subcontractor licensed by the State of California who, under subcontract to the 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 prime contractor's total bid.

24.02 In accordance with Section 4107 of the California Public Contract Code, no Contractor whose Bid is accepted shall without consent of the OWNER either: (a) substitute a person as a Subcontractor in place of the Subcontractor listed in the original Bid; or (b) permit a subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone 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 prime Contractor's total Bid as to which his or her original Bid did not designate a Subcontractor.

24.03 Penalties for failure to comply with the foregoing sections of the California Public Contract Code are set forth in Sections 4106, 4110, and 4111 of the Public Contract Code. A prime contractor violating this law violates his or her contract and the awarding authority may exercise the option, in its own discretion, of (1) canceling his or her contract or (2) assessing the prime contractor a penalty in an amount of not more than **ten percent (10%)** of the amount of the subcontract involved, and this penalty shall be deposited in the fund out of which the prime contract is awarded. In any proceedings under this section the prime contractor shall be entitled to a public hearing and to **five (5) days**' notice of the time and place thereof.

ARTICLE 25 – FUNDING REQUIREMENTS

25.01 Bidders are to base their bids on the project funding being provided in whole or in part by the Heber Public Utility District which will review and approve the contract award, contract agreement, partial and final payments, and contract change orders.

25.02 Payment and retainage will comply with the contract agreement section 6.02 "Progress Payments; Retainage." Bidders are notified that this contract does not permit retainage to be placed in escrow nor to be invested for the benefit of the contractor.

25.03 Intentionally left blank

25.04 Bidders are notified of the requirement for affirmative action to ensure equal employment opportunity (Executive Order No. 11246) as set forth in the Equal Opportunity Requirements found in paragraph 18.10 of the General Conditions.

ARTICLE 26 – SUBSTITUTION OF SECURITY

26.01 Upon Contractor's request, HPUD will make payment of funds withheld from progress payments to ensure performance under the contract pursuant to the requirements of California Public Contracts Code, section 22300, if the Contractor deposits in escrow with HPUD, or with a bank acceptable to HPUD, securities eligible for investment under Government Code section 16430 or bank savings and loan certifications of deposit, subject to the following conditions:

a) Contractor shall bear the expense of HPUD and the escrow agent, and HPUD and the bank, in connection with the escrow deposit made.

b) Securities or certificates of deposit to be placed in escrow shall be of a value at least equivalent to the amount of retention to be paid to the Contractor pursuant to this Article.

c) Contractor shall enter into an escrow agreement satisfactory to HPUD, which agreement shall include provisions governing, <u>inter alias:</u>

1) the amount of securities to be deposited,
2) the providing of powers of attorney or other documents necessary for the transfer of the securities to be deposited,
3) conversion of cash to provide funds to meet defaults by Contractor including, but not limited to, termination of Contractor's control over the work, stop notice filed pursuant to law or other amounts to be kept or retained under the provisions of the contract,
4) decrease in value of securities on deposit,
5) the termination of the escrow upon completion of the contract.

d) Contractor shall obtain the written consent of the surety to such agreement.

3. WAGE REQUIREMENTS

Notice is hereby given that, pursuant to 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site. Project specific wage rates follow this specification section.

This Public Works project is a multi-agency funded project and requires compliance with both California's Department of Industrial Relations requirements and the California Labor Codes for a Public Works project. This includes the current wage decisions. The California lock in date for the wage decisions is the date of the bid advertising thus requiring compliance with California, Imperial County 2019-02 and various pre-determined increases.

Statutory Penalty for Failure to Pay Minimum Wage

A. In accordance with 1775 of the California Labor Code, the Contractor shall as a penalty to the State of political subdivision on whose behalf a Contract is made or awarded, forfeit **fifty dollars ($50.00)** for each calendar day or portion thereof, for each worker paid less than the stipulated prevailing rate for any public work done under the Contract by the Contractor or by any Subcontractor under the Contractor.

Statutory Penalty for Unauthorized Overtime Work

A. In accordance with 1813 of the California Labor Code, the Contractor shall as a penalty to the State or political subdivision on whose behalf the Contract is made or awarded, forfeit **twenty-five dollars ($25.00)** for each worker employed in the execution of the Contract by the Contractor or by any Subcontractor for each calendar day during which said worker is required or permitted to work more than eight hours in any one calendar day and forty hours in any one calendar week in violation of 1810-1815 of the California Labor Code.

Apprenticeship Requirements

A. CONTRACTOR agrees to comply with 1777.5, 1777.6 and 1777.7 of the California Labor Code relating to the employment of apprentices. The responsibility for compliance with these provisions is fixed with the prime contractor for all apprenticeship occupations. Under these sections of the law, Contractors and Subcontractors must employ apprentices in apprenticeship occupations, where journeymen in the craft are employed on the public work, in a ratio of not less than one (1) apprentice hour for each five (5) journeymen hours (unless an exemption is granted in accordance with 1777.5) and Contractors and Subcontractors shall not discriminate among otherwise qualified employees as indentured apprentices on any public work solely on the ground of race, religious creed, color, national origin, ancestry, sex, or age, except as provided in 3077 of the Labor Code. Only apprentices, as defined in 3077, which provides that an apprentice must be at least sixteen (16) years of age, who are in training under apprenticeship standards and who have signed written apprentice agreements will be employed on public works in apprenticeship occupations.

Payroll Records

A. Contractor shall keep accurate payroll records on forms provided by the Division of Labor Standards Enforcement, or alternatively, the Contractor shall keep accurate payroll records containing the same information. Said information shall include, but not be limited to, a record of the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and

actual per diem wages paid to each journeyman, apprentice, or worker employed by the Contractor. Such record shall be made available for inspection at all reasonable hours, and a copy shall be made available to employee or his authorized representative, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards in compliance with California Labor Code, Section 1776. Upon written notice from the OWNER or the Division of Labor Standards Enforcement, the Contractor shall, within **ten (10) days**, file with the Owner a certified copy of the payroll records. The Contractor shall cause an identical clause to be included in every subcontract for the Work.

4. BID FORM

Project Identification: **Heber Public Utility District – HPUD Recreation Center**

Contract Identification and Number: _____

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ARTICLE 1 - BID RECIPIENT

1.01 This Bid Is Submitted To: **Heber Public Utility District at 1078 Dogwood Road, Suite 103, Heber, CA 92249**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in the Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGMENTS

2.01 The Bidder accepts all of the terms and conditions of the Advertisement and Instructions to Bidders, including without limitations those dealing with the dispositions of Bid Security. The Bid will remain subject to acceptance for **sixty (60) days** after the Bid Opening, or for such longer period of time that the Bidder may agree to in writing upon a request from the Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, the Bidder represents that:

A. The Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____

B. The Bidder has visited the Site and become familiar with and is satisfied as to the General, Local, and Site conditions that may affect cost, progress, and performance of the Work.

C. The Bidder is familiar with and is satisfied as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. The Bidder has carefully studied the Environmental Assessment and is familiar with the requirements of these documents. The Contractor shall pay for all costs associated with the requirements of these documents and include these costs in the Basis of Bid – Schedule of Values. The Environmental Assessment is contained in the Special Conditions Section of the Project Manual.

E. The Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by the Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by the Bidder, and safety precautions and programs incident thereto.

F. The Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. The Bidder is aware of the general nature of the Work to be performed by the Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. The Bidder has correlated the information known to the Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. The Bidder has given the Owner written notice of all conflicts, errors, ambiguities, or discrepancies that the Bidder has discovered in the Bidding Documents, and the written resolution thereof by the Engineer is acceptable to the Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

K. The Bidder will submit written evidence of its authority to do business in the State where the Project is located not later than the date of its execution of the Agreement.

ARTICLE 4 - FURTHER REPRESENTATIONS

4.01 The Bidder further represents that:

A. This Bid is genuine and not made in the interest of or on the behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation;

B. The Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. The Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. The Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over the Owner.

ARTICLE 5 – BASIS OF BID – SCHEDULE OF VALUES

5.01 The Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

No	Description	Cost
1	Mobilization, Submittals, Demobilization, Protection of Existing Facilities, Administration, Temporary Facilities, Safety Requirements, Insurance, Bid Bond, Payment Bond, Performance Bond, Taxes, Permits, Fees, Facilities Startup, As-Builts, Restroom Facilities, Project Signs, County of Imperial Building Permit Fees, Staging Area Costs, Construction Staking and Surveying Costs, and Similar Expenses.	$_____
2	Construction of the HPUD Recreation Center Building including the preparation of Building Improvement Plans in its entirety in strict accordance with the Improvement Plans; the Project Manual and any addendum(a) for the lump sum listed: The HPUD Recreation Center is to be constructed as a complete and fully functional facility and include all components required under current code requirements and Industry Standards for a similar recreational building. The concrete foundation and earth building pad shall be included with the cost.	$_____
3	Construction of Off-site and On-site Improvements (except for the Recreational Center Building) in its entirety in strict conformance with the Improvement Plans, the Project Manual and any addendum(a) for the lump sum listed:	$_____

TOTAL LUMP SUM BID (Items 1 through 3) in Figures $_____

TOTAL LUMP SUM BID (Items 1 through 3) in Words

_____

_____

_____(only).

NOTE: The Project Manual is the bound documentary information prepared for bidding and constructing the Work. The listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the Table of Contents in Volume 1 of the Project Manual. See General Condition, Article 1, Section 1.01, Item 37. The Bidder is to review the entire contents of the Project Manual and understand its provisions and requirements prior to preparing the Bid Form.

ARTICLE 6 - TIME OF COMPLETION

6.01 The Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 The Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work within the Contract Times.

ARTICLE 7 - ATTACHMENTS TO BID

7.01 The following documents are attached to and made a condition of the Bid:

A. Non-Collusion Affidavit; and

B. Required Bid Security of ten percent (10%) in the form of a Bid Bond (Section 00430) or Certified Check (circle type of security provided); and

C. If Bid amount exceeds $10,000, signed Compliance Statement/Certifications of Non-segregated Facilities (Section 00440). Refer to specific equal opportunity requirements set forth in paragraph 18.10 of the General Conditions; and

D. If Bid amount exceeds $25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion- Lower Tier Covered Transactions (Within Section 00451); and

E. If Bid amount exceeds $100,000, signed Certification for Contracts, Grant, and Loans (Section 00460). Refer to paragraph 18.11 of the General Conditions; and

F. Worker's Compensation Certification; and

G. A Tabulation of Subcontractors with Names and Addresses and percent of Total Contract; and

H. Required Bidder Qualifications Statement with supporting data; and

I. Tabulation of Major Material Suppliers; and

ARTICLE 8 - DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 - BID SUBMITTAL

9.01 This Bid submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

SEAL, if required by State

Doing business as: _____

A Partnership

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

SEAL, if required by State

Name (typed or printed): _____

A Corporation

Corporation Name: _____

State of Incorporation: _____

Type (General Business, Profession, Service, Limited Liability): _____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Attest _____
(Signature of Corporate Secretary)

CORPORATE SEAL, if required by State

Date of Qualification to do business in _____ California is ___/___/_____

A Joint Venture

Name of Joint Venture: _____

First Joint Venture Name: _____

SEAL, if required by State

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Second Joint Venture Name: _____

SEAL, if required by State

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is party to the venture should be in the manner indicated above.)

Bidder's Business Address:

_____

_____

Business Phone No. (_____)_____

Business Fax No. (_____)_____

Business E-Mail Address _____

State Contractor License No. _____.

Employer's Tax ID No. _____

Phone and Fax Numbers, and Address for receipt of official communications, if different from Business Contact Information:

_____

_____

9.02 Bid submitted on _____, 20___.

5. NON COLLUSION AFFIDAVIT
(Public Contract Code Section 7106)

State of California

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 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.

By: _____

Subscribed and sworn to before me on _____
(Date)

_____
(Notary Public)

(SEAL)

6. BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):
Heber Public Utility District
1078 Dogwood Road, Suite 103
Heber, CA 92249

BID
Bid Due Date: **Thursday, October 10, 2019**
Project: **Heber Public Utility District – HPUD Recreation Center**
BOND
Bond Number:

Date (Not later than Bid due date):

Penal sum _____ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title
	(Attach Power of Attorney)
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: Above addresses are to be used for giving required notice.

1. The Bidder and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to the Owner upon default of the Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of the Surety's liability.

2. Default of the Bidder shall occur upon the failure of the Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the Owner) the executed Agreement required by the Bidding Documents and the Performance and Payment Bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

   3.1 The Owner accepts the Bidder's Bid and the Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the Owner) the executed Agreement required by the Bidding Documents and the Performance and Payment Bonds required by the Bidding Documents, or

   3.2 All Bids are rejected by the Owner, or

   3.3 The Owner fails to issue a Notice of Award to the Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by the Bidder and, if applicable, consented to by the Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by the Bidder and within **thirty (30) calendar days** after receipt by the Bidder and the Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. The Surety waives notice of any and all defenses based upon or arising out of any time extension to issue the Notice of Award agreed to in writing by the Owner and the Bidder, provided that the total time for issuing the Notice of Award including extensions shall not in the aggregate exceed **one hundred and twenty (120) days** from Bid due date without the Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to **thirty (30) calendar days** after the notice of default required in Paragraph 4 above is received by the Bidder and the Surety and in no case later than **one (1) year** after the Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the State of California.

8. Notices required hereunder shall be in writing and sent to the Bidder and the Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. The Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of the Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

7. COMPLIANCE STATEMENT

This statement relates to a proposed contract with **Heber Public Utility District**
(Name of borrower or grantee)

Who expects to finance the contract with assistance from the other State of California agencies or their successor agencies. I am the Undersigned Bidder or Prospective Contractor. I represent that:

1. I **[ ]** have, **[ ]** have not, participated in a previous contract or subcontract subject to Executive Order 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.

2. If I have participated in such a contract or subcontract, I **[ ]** have, [**]** have not, filed all Compliance Reports that I have been required to file in connection with the contract or subcontract.

If the proposed contract is for $50,000 or more and I have 50 or more employees, I also represent that:

3. I **[ ]** have, **[ ]** have not, previously had contracts subject to the written Affirmative Action Program Requirements of the Secretary of Labor.

4. If I have participated in such a contract or subcontract, I **[ ]** have, **[ ]** have not, developed and placed on file at each establishment Affirmative Action Programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required by me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to the Heber Public Utility District, or to the office of the governing agency where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity Clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods).

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS
FOR
CERTIFICATIONS OF NON-SEGREGATED FACILITIES

A certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually)

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

Date**:** _____ _____
(Signature of Bidder or Prospective Contractor)

_____
Address (including Zip Code)

8. CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form – LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1354, Title 34, US Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____
(Organization/Firm)

_____
(Name & Title of Authorized Representative)

_____ _____
(Signature) (Date)

9. CONTRACTOR'S CERTIFICATION REGARDING WORKER'S COMPENSATION INSURANCE

State of California

County of _____

I am aware of the requirements that every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that applicable codes, and I will comply with such provisions before commending the performance of the work of this Contract.

_____
(Organization/Firm)

_____
(Name & Title of Authorized Representative)

_____ _____
(Signature) (Date)

11. TABULATION OF SUBCONTRACTORS

No.	Subcontractor	Work To Be Performed
1.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
2.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
3.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
4.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
5.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	

No.	Subcontractor	Work To Be Performed
6.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
7.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
8.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
9.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	
10.	**Name:**	
	Address:	
	DIR Registration Number:	
	CA Contractor's License Number:	
	Percent of Total Contract:	

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

11. TABULATION OF MAJOR MATERIAL SUPPLIERS

The contractor shall indicate opposite each item of equipment or material listed below the name of the manufacturer and supplier of the equipment or material proposed to be furnished under the bid.

No.	Item	Manufacturer	Supplier
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

13.			
14			
15			
16			
17			
18			
19			
20			
21.			
22.			
23.			
24.			
25.			
26.			

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

12. NOTICE OF AWARD

Dated: _____

Project: **HPUD Recreation Center**	Owner: **Heber Public Utility District**	Owner's Contract No.:
Contract:		Engineer's Project No.: **744.077**

Bidder:

Bidder's Address (send Certified Mail, Return Receipt Requested):

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the construction of the **Heber Public Utility District – HPUD Recreation Center**.

The Contract Price of your Contract is _____

Dollars ($_____).

You must comply with the following conditions within **fifteen (15) days** of the date you receive this Notice of Award.

1. Deliver to the Owner four (4) fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Performance and Payment Bonds and Insurance Certificate as specified in the Instructions to Bidders (Article 20), and General Conditions (Paragraph 5.01)

Failure to comply with these conditions within the time specified will entitle the Owner to consider you in default, annul this Notice of Award and declare your Bid Security forfeited.

Within **ten (10) days** after you comply with the above conditions, the Owner will return to you one (1) fully executed counterpart of the Contract Documents.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Heber Public Utility District
(Owner)

_____
(Authorized Signature)

_____
(Title)

ACCEPTANCE NOTICE

Receipt of above NOTICE OF AWARD is hereby acknowledged

By: _____,

this the _____ day of _____, 2019.

By: _____
(Authorized Signature)

_____
(Title)

State of _____ }

County of _____ }

On _____, before me, _____,

Notary Public, personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____
Signature of Notary Public

13. AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)
FUNDING AGENCY EDITION

THIS AGREEMENT is by and between **Heber Public Utility District** ("Owner")
and
_____("Contractor").

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

TABLE OF ARTICLES ***Page***

Agreement	00521-1
Article 1-Work	00521-1
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Article 7-Interest	00521-4
Article 8-Contractor's Representatives	00521-4
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ARTICLE 1 – WORK

1.01 The Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Heber Public Utility District – HPUD Recreation Center

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Heber Public Utility District – HPUD Recreation Center

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by ***The Holt Group, Inc.*** (Design Engineer). The Owner will have a Construction Manager for this project, who is to act as the Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to the Engineer in the Contract Documents for the construction phase in connection with the completion of the Work, except for modifying the project deign or plans and specifications. The Construction Manager shall act as the Engineer during the construction phase as specified elsewhere in the Contract Documents. The Design Engineer will only be involved for the design related clarifications and changes required as requested by the Owner.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time is of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Final Completion*

A. The Work will be completed and ready for Final Payment within **two hundred ten (210) calendar** days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions.

4.03 *Liquidated Damages*

A. The Contractor and the Owner recognize that time is of the essence for this Agreement and that the Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration preceding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, the Owner and the Contractor agree that as liquidated damages for delay (but not as a penalty), the Contractor shall pay Owner **$1,000.00** for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A and 5.01.B below:

A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph 5.01.B:

B. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the General Conditions. Unit prices have been computed as provided in Paragraph 11.03 of the General Conditions.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. The Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be reviewed, approved and processed by the Construction Manager as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. The Owner shall make progress payments on account of the Contract Price on the basis of the Contractor's Applications for Payment on or about the 20th day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the Schedule of Values established as provided in Paragraph 2.07.A of the General Conditions.

1. Prior to Substantial Completion, Progress Payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as the Engineer may determine or the Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:

    a. **Ninety-five percent (95%)** of Work completed (with the balance being retainage); and

    b. **Ninety-five percent (95%)** of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

2. Upon Substantial Completion, the Owner shall pay an amount sufficient to increase total payments to the Contractor to **ninety-five percent (95%)** of the Work completed, less such amounts as the Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions.

6.03 *Final Payment*

A. Upon receipt of the final Application for Payment accompanied by the Engineer's recommendation of payment in accordance with Paragraph 14.07 of the General Conditions, the Owner shall pay the Contractor as provided in Paragraph 14.07 of the General Conditions the remainder of the Contract Price as recommended by the Engineer as provided in said Paragraph 14.07, less any sum the Owner is entitled to set off against the Engineer's recommendation, including but not limited to liquidated damages.

6.04 *Substitution of Security*

Upon Contractor's request, The Owner will make payment of funds withheld from progress payments to ensure performance under the contract pursuant to the requirements of California Public Contracts Code, section 22300, if the Contractor deposits in escrow with the Owner, or with a bank acceptable to the Owner, securities eligible for investment under Government Code section 16430 or bank savings and loan certifications of deposit, subject to the following conditions:

A. Contractor shall bear the expense of the Owner and the escrow agent, and the Owner and the bank, in connection with the escrow deposit made.

B. Securities or certificates of deposit to be placed in escrow shall be of a value at least equivalent to the amount of retention to be paid to the Contractor pursuant to this Article.

C. Contractor shall enter into an escrow agreement satisfactory to the Owner, which agreement shall include provisions governing, <u>inter alias:</u>

    1. the amount of securities to be deposited,
    2. the providing of powers of attorney or other documents necessary for the transfer of the securities to be deposited,
    3. conversion of cash to provide funds to meet defaults by Contractor including, but not limited to, termination of Contractor's control over the work, stop notice filed pursuant to law or other amounts to be kept or retained under the provisions of the contract,
    4. decrease in value of securities on deposit,
    5. the termination of the escrow upon completion of the contract.

D. Contractor shall obtain the written consent of the surety to such agreement.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at **eight percent (8%)** per annum**.**

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce the Owner to enter into this Agreement the Contractor makes the following representations:

A. The Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. The Contractor has visited the Site and become familiar with and is satisfied as to the General, Local, and Site Conditions that may affect cost, progress, and performance of the Work.

C. The Contractor is familiar with and is satisfied as to all Federal, State, and Local Laws and Regulations that may affect the cost, progress, and performance of the Work.

D. The Contractor has obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (Surface, Subsurface, and Underground Facilities) at or contiguous to the Site which may affect the cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.

E. The Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

F. The Contractor is aware of the general nature of work to be performed by the Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

G. The Contractor has correlated the information known to the Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

H. The Contractor has given the Owner written notice of all conflicts, errors, ambiguities, or discrepancies that the Contractor has discovered in the Contract Documents, and the written resolution thereof by the Owner is acceptable to the Contractor.

I. The Contract Documents are generally sufficient to indicate and convey a clear understanding of all terms and conditions for the performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 7, inclusive).

2. Performance Bond (pages _____ to _____, inclusive).

3. Payment Bond (pages _____ to _____, inclusive).

4. Other bonds (pages _____ to _____, inclusive).

   a. (pages to , inclusive).

   b. (pages to , inclusive).

   c. (pages to , inclusive).

5. General Conditions (pages _____ to _____, inclusive).

6. Supplementary Conditions (pages _____ to _____, inclusive).

7. Technical Conditions (pages _____ to _____, inclusive).

8. Special Conditions (pages _____ to _____, inclusive).

9. Specifications as listed in the Table of Contents of the Project Manual.

10. Drawings consisting of _____ sheets.

11. Addenda (numbers _____ to _____, inclusive).

12. Exhibits to this Agreement (enumerated as follows):

    a. The Contractor's Bid (pages _____ to _____, inclusive).

    b. Documentation submitted by the Contractor prior to the Notice of Award (pages _____ to _____, inclusive).

    c. Federal and State Contract Language Inclusion – January 01, 2014 – Exhibit 'A'

13. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

    a. Notice to Proceed (pages _____ to _____, inclusive).

    b. Work Change Directives (pages _____ to _____, inclusive).

    c. Change Order(s).

B. The documents listed in Paragraph 9.01.A are attached to this Agreement.

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

E. Contractor represents and warrants that it and its subcontractors are not ineligible to work for the Owner due to violations of Labor Code Sections 1777.1 and 1777.7.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

A. The Owner and the Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon the Owner and the Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Prevailing Wage*

A. Notice is hereby given that, pursuant to 1773 of the Labor Code of the State of California, the Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each site.

IN WITNESS WHEREOF, the Owner and the Contractor have signed this Agreement in four (4) copies. One (1) counterpart each has been delivered to the Owner, the Contractor, the Engineer, and the Agency. All portions of the Contract Documents have been signed, initialed, or identified by the Owner and the Contractor or identified by the Engineer on their behalf.

This Agreement is dated_____. This Agreement shall not be effective unless and until the Agency's designated representative concurs.

OWNER: **Heber Public Utility District**

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

CONTRACTOR:

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

Agent for service of process:

_____

(If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

Agency Concurrence:
As lender or insurer of funds to defray the costs of this Contract, and without liability for any payments there under, the Agency hereby concurs in the form, content, and execution of this Agreement.

Agency: _____

Date: _____

By: _____

Title: _____

16. NOTICE TO PROCEED

Dated: _____

Project:	Owner:	Owner's Contract No.:
HPUD Recreation Center Project	**Heber Public Utility District** **1078 Dogwood Road, Suite 103** **Heber, CA 92249**	
Contract:		Engineer's Project No.: **744.077**

Contractor:

Contractor's Address (send Certified Mail, Return Receipt requested):

You are notified that the Contract Times under the above contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents.

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and the Owner must each deliver to the other (with copies to the Engineer and other identified additional insured's) Certificates of Insurance which each is required to purchase and maintain in accordance with the Contract Documents.

You are required to return an acknowledged copy of this NOTICE TO PROCEED to the OWNER.

	Heber Public Utility District
Contractor	Owner
Given by:	Given by:
Authorized Signature	Authorized Signature
Title	Title
Date	Date

Copy to Engineer

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17. PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):
Heber Public Utility District
1078 Dogwood Road, Suite 103
Heber, CA 92249

CONTRACT
Date:
Amount:
Description: **HPUD Recreation Center Project**

BOND
Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

The Surety and the Contractor, intending to be legally bound hereby, subject to the terms hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____ (Seal)
Name and Title:

(Space is provided below for signatures of additional parties, if required.)

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____ (Seal)
Name and Title:

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

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1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Contract, which is incorporated herein by reference.

2. If the Contractor performs the Contract, the Surety and the Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

   3.1 The Owner has notified the Contractor and the Surety, at the addresses described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than **fifteen (15) days** after receipt of such notice to discuss methods of performing the Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

   3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than **twenty (20) days** after the Contractor and the Surety have received notice as provided in Paragraph 3.1; and

   3.3 The Owner has agreed to pay the Balance of the Contract Price to:

      1. The Surety in accordance with the terms of the Contract;

      2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

   4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Contract; or

   4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

   4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor Default; or

   4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

      1. After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or

      2. Deny liability in whole or in part and notify the Owner citing reasons therefore.

5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond **fifteen (15) days** after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

6. After the Owner has terminated Contractor's right to complete the Contract, and if the Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Contract, and the

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responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

6.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract;

6.2 Additional Legal, Design Professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.

7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within **two (2) years** after Contractor Default or within **two (2) years** after the Contractor ceased working or within **two (2) years** after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted here from and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.

12.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all the Contract Documents and changes thereto.

12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY
(Name, Address and Telephone)

SURETY AGENCY OR BROKER: _____

_____

_____

OWNER'S REPRESENTATIVE: ***TBD***

18. PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):
Heber Public Utility District
1078 Dogwood Road, Suite 103
Heber, CA 92249

CONTRACT
Date:
Amount:
Description: **HPUD Recreation Center Project**

BOND
Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

The Surety and the Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____ (Seal)
Name and Title:

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____ (Seal)
Name and Title:

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

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1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the Owner, this obligation shall be null and void if the Contractor:

   2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

   2.2 Defends, indemnifies, and holds harmless the Owner from all claims, demands, liens, or suits alleging non-payment by the Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided the Owner has promptly notified the Contractor and the Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

   4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

   4.2 Claimants who do not have a direct contract with the Contractor:

      1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within **ninety (90) days** after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and

      2. Have either received a rejection in whole or in part from the Contractor, or not received within **thirty (30) days** of furnishing the above notice any communication from the Contractor by which the Contractor had indicated the claim will be paid directly or indirectly; and

      3. Not having been paid within the above **thirty (30) days,** have sent a written notice to the Surety and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by the Owner to the Contractor or to the Surety that is sufficient compliance.

6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

   6.1 Send an answer to that Claimant, with a copy to the Owner, within **forty-five (45) days** after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

   6.2 Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the Owner to the Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the Work.

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9. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of **one (1) year** from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by the Surety, the Owner, or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions.

    15.1 Claimant: An individual or entity having a direct contract with the Contractor, or with a first-tier subcontractor of the Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, Architectural and Engineering Services required for performance of the Work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

    15.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

    15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY
(Name, Address and Telephone)

SURETY AGENCY OR BROKER: _____

_____

_____

OWNER'S REPRESENTATIVE: ***TBD***

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19. CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____the duly authorized and acting legal representative of

Heber Public Utility District do hereby certify as follows:

I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Signature: _____

Name: _____

Title: _____

Date: _____

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20. CERTIFICATE OF SUBSTANTIAL COMPLETION

Project:	Owner:	Owner's Contract No.:
HPUD Recreation Center Project	**Heber Public Utility District** **1078 Dogwood Road, Suite 103** **Heber, CA 92249**	
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: **744.077**

This [tentative] [definitive] Certificate of Substantial Completion applies to:

☐ All Work under the Contract Documents: ☐ The following specified portions:

_____

_____

_____

_____
Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of the Owner, the Contractor and the Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A (tentative) (revised tentative) (definitive) list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between the OWNER and the CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

_____

_____

_____

Contractor's Amended Responsibilities:

_____

_____

_____

The following documents are attached to and made part of this Certificate:

_____

_____

_____

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This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of the Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

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21. STANDARD GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda* – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agency* – The Federal or State Agency named as such in the Agreement.

3. *Agreement* – The written instrument which is evidence of the agreement between the Owner and the Contractor covering the Work.

4. *Application for Payment* – The form acceptable to the Engineer which is to be used by the Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

5. *Asbestos* – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

7. *Bidder* – The individual or entity who submits a Bid directly to the Owner.

8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).

9. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, Bid Security of Acceptable Form, if any, and the Bid Form with any supplements.

10. *Change Order* – A document recommended by the Engineer which is signed by the Contractor and the Owner and Agency and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

11. *Claim* – A demand or assertion by the Owner or Contractor seeking an adjustment of the Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

12. *Construction Manager* – The individual or entity who performs the roles as the representative of Owner/Engineer during the construction phase.

13. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

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14. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

15. *Contract Price* – The moneys payable by the Owner to the Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

16. *Contract Times* – The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by the Engineer's written recommendation of final payment.

17. *Contractor* – The individual or entity with whom the Owner has entered into the Agreement.

18. *Cost of the Work* – See Paragraph 11.01.A for definition.

19. *Drawings* – That part of the Contract Documents prepared or approved by the Engineer which graphically shows the scope, extent, and character of the Work to be performed by the Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

20. *Effective Date of the Agreement* – The date indicated in the Agreement on which it becomes effective; if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

21. *Engineer* – The individual or entity named as such in the Agreement. The Construction Manager takes the Engineer's role during the construction phase related to the construction activities.

22. *Field Order* – A written order issued by the Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

23. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

24. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

25. *Hazardous Waste* – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

26. *Laws and Regulations; Laws or Regulations* – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

27. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

28. *Milestone* – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to the Substantial Completion of all of the Work.

29. *Notice of Award* – The written notice by the Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, the Owner will sign and deliver the Agreement.

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30. *Notice to Proceed* – A written notice given by the Owner to the Contractor fixing the date on which the Contract Times will commence to run and on which the Contractor shall start to perform the Work under the Contract Documents.

31. *Owner* – The individual or entity with whom the Contractor has entered into the Agreement and for whom the Work is to be performed.

32. *PCBs* – Polychlorinated Biphenyls.

33. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Progress Schedule* – A schedule prepared and maintained by the Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

35. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

36. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the Table(s) of Contents.

37. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

38. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.

39. *Resident Project Representative* – The authorized representative of the Engineer who may be assigned to the Site or any part thereof.

40. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

41. *Schedule of Submittals* – A schedule, prepared and maintained by the Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

42. *Schedule of Values* – A schedule, prepared and maintained by the Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing the Contractor's Applications for Payment.

43. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the Contractor and submitted by the Contractor to illustrate some portion of the Work.

44. *Site* – Lands or areas indicated in the Contract Documents as being furnished by the Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by the Owner which are designated for the use of the Contractor.

45. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

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46. *Subcontractor* – An individual or entity having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

47. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

48. *Successful Bidder* – The Bidder submitting a responsive Bid to whom the Owner makes an award.

49. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.

50. *Supplier* – A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with the Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by the Contractor or any Subcontractor.

51. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

52. *Unit Price Work* – Work to be paid for on the basis of unit prices.

53. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

54. *Work Change Directive* – A written statement to the Contractor issued on or after the Effective Date of the Agreement and signed by the Owner and the Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of Professional Judgment by the Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of the Engineer as to the Work. It is intended that such exercise of Professional Judgment, Action or Determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the Design Concept of the Completed Project as a functioning whole as shown or

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indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to the Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of **twenty-four (24) hours** measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

   a. Does not conform to the Contract Documents, or

   b. Does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

   c. Has been damaged prior to the Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by the Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of the Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When the Contractor delivers the executed counterparts of the Agreement to the Owner, the Contractor shall also deliver to the Owner such bonds as the Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, the Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may

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reasonably request) which the Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. The Owner shall furnish to the Contractor ten (10) sets of printed or hard copies of the "Issued for Construction" Drawings and "Conformed" Project Manuals. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.

2.04 *Starting the Work*

A. The Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within **ten (10) days** after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), the Contractor shall submit to the Engineer for timely review**:**

1. A Preliminary Progress Schedule;

2. A Preliminary Schedule of Submittals; and

3. A Preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during the performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a Conference attended by the Owner, Contractor, Engineer, Agency, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required project records.

2.07 *Initial Acceptance of Schedules*

A. At least **ten (10) days** before submission of the first Application for Payment a conference attended by the Contractor, Engineer, and others as appropriate will be held to review for acceptability to the Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. The Contractor shall have an additional **five (5) days** to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to the Contractor until acceptable schedules are submitted to the Engineer.

1. The Progress Schedule will be acceptable to the Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on the Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve the Contractor from the Contractor's full responsibility therefore.

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2. The Contractor's Schedule of Submittals will be acceptable to the Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. The Contractor's Schedule of Values will be acceptable to the Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to the Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by the Engineer as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of the Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to the Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, the Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. The Contractor shall promptly report in writing to the Engineer any conflict, error, ambiguity, or discrepancy which the Contractor may discover and shall obtain a written interpretation or clarification from the Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, the Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, the Contractor shall promptly report it to the Engineer in writing. The Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until

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an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. The Contractor shall not be liable to the Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless the Contractor knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. The provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. The provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. The Contractor and any Subcontractor or Supplier shall not:

1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of the Engineer or the Engineer's consultants, including electronic media editions; or

2. Reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without the written consent of the Owner and Engineer and specific written verification or adaptation by the Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude the Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by the Owner or Engineer to the Contractor or the Contractor to the Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the

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user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies shall govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within **sixty (60) days**, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the **sixty (60) days** acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS; HAZARDOUS ENVIRONMENTAL CONDITIONS

4.01 *Availability of Lands*

A. The Owner shall furnish the Site. The Owner shall notify the Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which the Contractor must comply in performing the Work. The Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If the Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in the Owner's furnishing the Site or a part thereof, the Contractor may make a Claim therefore as provided in Paragraph 10.05.

B. Upon reasonable written request, the Owner shall furnish the Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and the Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. The Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:*

B. The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that the Engineer has used in preparing the Contract Documents; and

2. Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that the Engineer has used in preparing the Contract Documents.

C. *Limited Reliance by the Contractor on Technical Data Authorized:*

D. The Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," the Contractor may not rely upon or make any claim against the Owner or Engineer, or any of their Related Entities with respect to:

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1. The completeness of such reports and drawings for the Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor, and safety precautions and programs incident thereto; or

2. Other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. Any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If the Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. Is of such a nature as to establish that any "technical data" on which the Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. Is of such a nature as to require a change in the Contract Documents; or

3. Differs materially from that shown or indicated in the Contract Documents; or

4. Is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

5. then the Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify the Owner and the Engineer in writing about such condition. The Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, the Engineer will promptly review the pertinent condition, determine the necessity of the Owner obtaining additional exploration or tests with respect thereto, and advise the Owner in writing (with a copy to the Contractor) of the Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in the Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. Such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. With respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. The Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. The Contractor knew of the existence of such conditions at the time the Contractor made a final commitment to the Owner with respect to the Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

   b. The existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the

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Bidding Requirements or Contract Documents to be conducted by or for the Contractor prior to the Contractor's making such final commitment; or

c. The Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If the Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefore as provided in Paragraph 10.05. However, the Owner and Engineer, and any of their Related Entities shall not be liable to the Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to the Owner or Engineer by the owners of such Underground Facilities, including the Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. The Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and the Contractor shall have full responsibility for:

a. Reviewing and checking all such information and data,

b. Locating all Underground Facilities shown or indicated in the Contract Documents,

c. Coordination of the Work with the owners of such Underground Facilities, including the Owner, during construction, and

d. The safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, the Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to the Owner and Engineer. The Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, the Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If the Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that the Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If the Owner and Contractor are unable to agree upon entitlement to or on the amount or extent, if any, of any such

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adjustment in Contract Price or Contract Times, the Owner or Contractor may make a Claim therefore as provided in Paragraph 10.05.

4.05 *Reference Points*

A. The Owner shall provide engineering surveys to establish reference points for construction which in the Engineer's judgment are necessary to enable the Contractor to proceed with the Work. The Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of the Owner. The Contractor shall report to the Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. The Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the Scope of the Work. The Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by the Contractor, Subcontractors, Suppliers, or anyone else for whom the Contractor is responsible.

D. If the Contractor encounters a Hazardous Environmental Condition or if the Contractor or anyone for whom the Contractor is responsible creates a Hazardous Environmental Condition, the Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify the Owner and Engineer (and promptly thereafter confirm such notice in writing). The Owner shall promptly consult with the Engineer concerning the necessity for the Owner to retain a Qualified Expert to evaluate such condition or take corrective action, if any.

E. The Contractor shall not be required to resume Work in connection with such condition or in any affected area until after the Owner has obtained any required permits related thereto and delivered to the Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If the Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of

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any adjustment in the Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which the Work is agreed to be resumed by the Contractor, either party may make a Claim therefore as provided in Paragraph 10.05.

F. If after receipt of such written notice the Contractor does not agree to resume such Work based upon a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then the Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If the Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefore as provided in Paragraph 10.05. The Owner may have such deleted portion of the Work performed by the Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom the Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate the Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by the Contractor or by anyone for whom the Contractor is responsible. Nothing in Paragraph 4.06. H shall obligate the Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. The Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of the Contractor's obligations under the Contract Documents. These bonds shall remain in effect until **one (1) year** after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. The Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the

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requirements of Paragraph 5.01.B, the Contractor shall promptly notify the Owner and Engineer and shall, within **twenty (20) days** after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by the Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverage's so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. The Contractor shall deliver to the Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by the Owner or any other additional insured) which the Contractor is required to purchase and maintain.

B. The Owner shall deliver to the Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by the Contractor or any other additional insured) which the Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. The Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and shall provide protection from claims set forth below which may arise out of or result from the Contractor's performance of the Work and the Contractor's other obligations under the Contract Documents, whether it is to be performed by the Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. Claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

4. Claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there from; and

6. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

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1. With respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insurer (subject to any customary exclusion regarding professional liability) the Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insurers, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insurers, and the insurance afforded to these additional insurers shall provide primary coverage for all claims covered thereby;

2. Include at least the specific coverage's and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. Include completed operations insurance;

4. Include contractual liability insurance covering the Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. Contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least **thirty (30) days** prior written notice has been given to the Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. Remain in effect at least until final payment and at all times thereafter when the Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. With respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least **two (2) years** after final payment.

    a. The Contractor shall furnish the Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to the Owner and any such additional insured of continuation of such insurance at final payment and **one (1) year** thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by the Contractor under Paragraph 5.04, the Owner, at the Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect the Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, the Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (the Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:

1. Include the interests of the Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. Be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than

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caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. Include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of Engineers and Architects);

4. Cover materials and equipment stored at the Site or at another location that was agreed to in writing by the Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by the Engineer;

5. Allow for partial utilization of the Work by the Owner;

6. Include testing and startup; and

7. Be maintained in effect until final payment is made unless otherwise agreed to in writing by the Owner, Contractor, and Engineer within **thirty (30) days** written notice to each other additional insured to whom a certificate of insurance has been issued.

B. The Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of the Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least **thirty (30) days** prior written notice has been given to the Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. The Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of the Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by the Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

A. The Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect the Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insured or additional insured there under. The Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and the Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages

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so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by the Contractor as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against the Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. Loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to the Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by the Owner; and

2. Loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by the Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by the Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against the Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with the Contractor and made payable to the Contractor as fiduciary for the insured, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. The Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.

B. The Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within **fifteen (15) days** after the occurrence of loss to the Contractor's exercise of this power. If such objection be made, the Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, the Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, the Contractor as fiduciary shall provide a bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either the Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within **ten (10) days** after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. The Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

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5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If the Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. The Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor shall not be responsible for the negligence of the Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, the Contractor shall assign a competent Resident Superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be the Contractor's representative at the Site and shall have authority to act on behalf of the Contractor. All communications given to or received from the superintendent shall be binding on the Contractor.

6.02 *Labor; Working Hours*

A. The Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. The Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. The Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without the Owner's written consent (which will not be unreasonably withheld) given after prior written notice to the Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, the Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of the Owner. If required by the Engineer, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. The Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. The Contractor shall submit to the Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in the Engineer's sole discretion an item of material or equipment proposed by the Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by the Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in the Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. In the exercise of reasonable judgment the Engineer determines that:

1) It is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) It will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) It has a proven record of performance and availability of responsive service; and

b. The Contractor certifies that, if approved and incorporated into the Work:

1) There will be no increase in cost to the Owner or increase in Contract Times, and

2) It will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

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a. If in the Engineer's sole discretion an item of material or equipment proposed by the Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. The Contractor shall submit sufficient information as provided below to allow the Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute items of material or equipment will not be accepted by the Engineer from anyone other than the Contractor.

c. The procedural requirements for review by the Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as the Engineer may decide is appropriate under the circumstances.

d. The Contractor shall make written application to the Engineer for review of a proposed substitute item of material or equipment that the Contractor seeks to furnish or use. The application:

1) *Shall certify that the proposed substitute item will:*
   1. Perform adequately the functions and achieve the results called for by the general design,
   2. be similar in substance to that specified, and be suited to the same use as that specified;

2) *Will state:*
   1. The extent, if any, to which the use of the proposed substitute item will prejudice the Contractor's achievement of Substantial Completion on time;

   2. whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the Owner for other work on the Project) to adapt the design to the proposed substitute item; and

   3. whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) *Will identify:*
   1. All variations of the proposed substitute item from that specified and available engineering,
   2. sales, maintenance, repair, and replacement services;

4) And shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other Contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by the Engineer. The Contractor shall submit sufficient information to allow the Engineer, in the Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by the Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

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D. *Special Guarantee:* The Owner may require the Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: The Engineer will record the Engineer's costs in evaluating a substitute proposed or submitted by the Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not the Engineer approves a substitute item so proposed or submitted by the Contractor, the Contractor shall reimburse the Owner for the charges of the Engineer for evaluating each such proposed substitute. The Contractor shall also reimburse the Owner for the charges of the Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with the Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: The Contractor shall provide all data in support of any proposed substitute or "or-equal" at the Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. The Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to the Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom the Owner may have reasonable objection. The Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to the Owner in advance for acceptance by the Owner by a specified date prior to the Effective Date of the Agreement, and if the Contractor has submitted a list thereof in accordance with the Supplementary Conditions, the Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. The Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by the Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of the Owner or Engineer to reject defective Work.

C. The Contractor shall be fully responsible to the Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as the Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract Documents:

1. Shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between the Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. Shall anything in the Contract Documents create any obligation on the part of the Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. The Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with the Contractor.

E. The Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with the Engineer through the Contractor.

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F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for the Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of the Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against the Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, the Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. The Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of the Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by the Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, the Contractor shall obtain and pay for all construction permits and licenses. The Owner shall assist the Contractor, when necessary, in obtaining such permits and licenses. The Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. The Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. The Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither the Owner nor the Engineer shall be responsible for monitoring the Contractor's compliance with any Laws or Regulations.

B. If the Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, the Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys and other Professionals and all court or arbitration or

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other dispute resolution costs) arising out of or relating to such Work. However, it shall not be the Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve the Contractor of the Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in the Contract Price or the Contract Times. If the Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Paragraph 10.05.

6.10 *Taxes*

A. The Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by the Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. The Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. The Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, the Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and the Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against the Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris during Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work, the Contractor shall clean the Site and the Work and make it ready for utilization by the Owner. At the completion of the Work the Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* The Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

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6.12 *Record Documents*

A. The Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to the Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to the Engineer.

6.13 *Safety and Protection*

A. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. All persons on the Site or who may be affected by the Work;

2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. The Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by the Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of the Owner or Engineer, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. The Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and the Engineer has issued a notice to the Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. The Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

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6.15 *Hazard Communication Programs*

A. The Contractor shall be responsible for coordinating any exchange of Material Safety Data Sheets (MSDS) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with applicable Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, the Contractor is obligated to act to prevent threatened damage, injury, or loss. The Contractor shall give the Engineer prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If the Engineer determines that a change in the Contract Documents is required because of the action taken by the Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. The Contractor shall submit Shop Drawings and Samples to the Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as the Engineer may require.

1. *Shop Drawings*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show the Engineer the services, materials, and equipment that the Contractor proposes to provide and to enable the Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which it is intended and other data may require to enable the Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to the Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of the Contractor.

C. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, the Contractor shall have determined and verified:

a. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. All information relative to the Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

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d. Shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that the Contractor has satisfied the Contractor's obligations under the Contract Documents with respect to the Contractor's review and approval of that submittal.

3. With each submittal, the Contractor shall give the Engineer specific written notice of any variation, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to the Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. The Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to the Engineer. The Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. The Engineer's review and approval will not extend to the means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. The Engineer's review and approval shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Documents unless the Contractor has complied with the requirements of Paragraph 6.17.C.3 and the Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. The Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. The Contractor shall make corrections required by the Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on previous submittals.

6.18 *Continuing the Work*

A. The Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with the Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as the Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. The Contractor warrants and guarantees to the Owner that all Work shall be in accordance with the Contract Documents and will not be defective. The Engineer and its Related Entities shall be entitled to rely on representation of the Contractor's warranty and guarantee.

B. The Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

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1. Abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom the Contractor is responsible; or

2. Normal wear and tear under normal usage.

C. The Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of the Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. Observations by Engineer;

2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by the Engineer or any payment related thereto by the Owner;

4. Use or occupancy of the Work or any part thereof by the Owner;

5. Any review and approval of a Shop Drawing or Sample Submittal or the issuance of a Notice of Acceptability by the Engineer;

6. Any inspection, test, or approval by others; or

7. Any correction of defective Work by the Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and the Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting there from but only to the extent caused by any negligent act or omission of the Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against the Owner or the Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of the actor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of the Contractor under Paragraph 6.20.A shall not extend to the liability of the Engineer and the Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. The preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications.

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6.21 *Delegation of Professional Design Services*

A. The Contractor will not be required to provide Professional Design Services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out the Contractor's responsibilities for the construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide Professional Services in violation of applicable law.

B. If Professional Design Services or Certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Engineer will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Engineer.

C. The Owner and the Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and the Engineer have specified to the Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, the Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. The Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. The Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. The Owner may perform other work related to the Project at the Site with the Owner's employees or via other direct contracts therefore, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. Written notice thereof will be given to the Contractor prior to starting any such other work; and

2. If the Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefore as provided in Paragraph 10.05.

B. The Contractor shall afford each other Contractor who is a party to such a direct contract, each utility owner and the Owner, if the Owner is performing other work with the Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. The Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of the Engineer and the others whose work will be affected. The duties and responsibilities of the Contractor under this Paragraph are for the benefit of such utility owners and other

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Contractors to the extent that there are comparable provisions for the benefit of the Contractor in said direct contracts between the Owner and such utility owners and other Contractors.

C. If the proper execution or results of any part of the Contractor's Work depends upon work performed by others under this Article 7, the Contractor shall inspect such other work and promptly report to the Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of the Contractor's Work. The Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with the Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If the Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in the Supplementary Conditions:

1. The individual or entity who will have authority and responsibility for coordination of the activities among the various Contractors will be identified;

2. The specific matters to be covered by such authority and responsibility will be itemized; and

3. The extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, the Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of the Owner.

B. Each other direct contract of the Owner under Paragraph 7.01.A shall provide that the other Contractor is liable to the Owner and the Contractor for the reasonable direct delay and disruption costs incurred by the Contractor as a result of the other contractor's inactions.

C. The Contractor shall be liable to the Owner and any other Contractor for the reasonable direct delay and disruption costs incurred by such other Contractor as a result of the Contractor's actions or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to the Contractor*

A. Except as otherwise provided in these General Conditions, the Owner shall issue all communications to the Contractor through the Construction Manager.

8.02 *Replacement of the Engineer*

A. In the case of termination of the employment of the Engineer, the Owner shall appoint an Engineer to whom the Contractor makes no reasonable objection and whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. The Owner shall promptly furnish the data required of the Owner under the Contract Documents.

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8.04 *Pay When Due*

A. The Owner shall make payments to the Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. The Owner's duties in respect of providing lands and easements and providing Engineering Surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to the Owner's identifying and making available to the Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by the Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. The Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. The owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. The Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on the Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, the Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with the Laws and Regulations applicable to the performance of the Work. The Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. The Owner's responsibility with respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent the Owner has agreed to furnish the Contractor reasonable evidence that financial arrangements have been made to satisfy the Owner's obligations under the Contract Documents, the Owner's responsibility with respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. The Construction Manager also described elsewhere within the Contract Documents as the Engineer in charge during the construction phase will be the Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of the Engineer as the Owner's representative during construction are set forth in the Contract Documents and will not be changed without the written consent of the Owner and the Engineer.

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9.02 *Visits to Site*

A. The Construction Manager will make visits to the Site at intervals appropriate to the various stages of construction as the Construction Manager deems necessary in order to observe as an experienced and Qualified Design Professional the progress that has been made and the quality of the various aspects of the Contractor's executed Work. Based upon information obtained during such visits and observations, the Construction Manager, for the benefit of the Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. The Construction Manager will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. The Construction Manager's efforts will be directed toward providing for the Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, the Construction Manager will keep the Owner informed of the progress of the Work and will endeavor to guard the Owner against defective Work.

B. The Engineer's visits and observations are subject to all the limitations on the Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of the Engineer's visits or observations of the Contractor's Work the Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. The Engineer shall furnish a Resident Project Representative to assist the Engineer in providing more extensive observation of the Work. The authority and responsibilities of the Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. The Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on the Owner and also on the Contractor, who shall perform the Work involved promptly. If the Owner or the Contractor believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefore as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. The Engineer will have authority to reject Work which the Engineer believes to be defective, or that the Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. The Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with the Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

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B. In connection with the Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of Professional Design Services, if any, see Paragraph 6.21.

C. In connection with the Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with the Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. The Engineer will determine the actual quantities and classifications of Unit Price Work performed by the Contractor. The Engineer will review with the Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). The Engineer's written decision thereon will be final and binding (except as modified by the Engineer to reflect changed factual conditions or more accurate data) upon the Owner and the Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. The Engineer will be the initial interpreter of the requirements of the Contract Documents and the judge of the acceptability of the Work there under. All matters in question and other matters between the Owner and the Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to the Engineer in writing within **thirty (30) days** of the event giving rise to the question.

B. The Engineer will, with reasonable promptness, render a written decision on the issue referred. If the Owner or the Contractor believes that any such decision entitles them to an adjustment in the Contract Price or the Contract Times or both, a Claim may be made under Paragraph 10.05. The date of the Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. The Engineer's written decision on the issue referred will be final and binding on the Owner and the Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, the Engineer will not show partiality to the Owner or the Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither the Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by the Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by the Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by the Engineer to the Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. The Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work. The Engineer will not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents.

C. The Engineer will not be responsible for the acts or omissions of the Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

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D. The Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative and assistants, if any.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, the Owner may, subject to written approval by the Agency at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, the Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If the Owner and the Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefore as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. The Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. The Owner and the Contractor shall execute appropriate Change Orders recommended by the Engineer covering:

1. Changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or the Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. Changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. Changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by the Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, the Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be the Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

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10.05 *Claims*

A. *Construction Manager's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Construction Manager for decision. A decision by the Construction Manager shall be required as a condition precedent to any exercise by the Owner or the Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to the Construction Manager and the other party to the Contract promptly (but in no event later than **thirty (30) days** after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within **sixty (60) days** after the start of such event (unless the Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in the Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in the Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the Engineer and the claimant within **thirty (30) days** after receipt of the claimant's last submittal (unless the Engineer allows additional time).

C. *Construction Manager's Action*: The Construction Manager will review each Claim and, within **thirty (30) days** after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. Deny the Claim in whole or in part,

2. Approve the Claim, or

3. Notify the parties that the Construction Manager is unable to resolve the Claim if, in the Construction Manager's sole discretion, it would be inappropriate for the Construction Manager to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that the Construction Manager does not take action on a Claim within said **thirty (30) days**, the Claim shall be deemed denied.

E. The Construction Manager's written action under the Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon the Owner and the Contractor, unless the Owner or the Contractor invoke the dispute resolution procedure set forth in Article 16 within **thirty (30) days** of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by the Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to the Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by the Owner, such costs shall be in

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amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of the Contractor in the performance of the Work under schedules of job classifications agreed upon by the Owner and the Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by the Owner.

2. The Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to the Contractor unless the Owner deposits funds with the Contractor with which to make payments, in which case the cash discounts shall accrue to the Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to the Owner, and the Contractor shall make provisions so that they may be obtained.

3. Payments made by the Contractor to Subcontractors for Work performed by the Subcontractors. If required by the Owner, the Contractor shall obtain competitive bids from subcontractors acceptable to the Owner and the Contractor and shall deliver such bids to the Owner, who will then determine, with the advice of the Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as the Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, Architects, Testing Laboratories, Surveyors, Attorneys, and Accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of the Contractor's employees incurred in discharge of duties connected with the Work.

    b. The Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of the Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from the Contractor or others in accordance with rental agreements approved by the Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which the Contractor is liable, imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

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f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by the Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of the Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that the Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of the Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by the Contractor, whether at the Site or in the Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of the Contractor's principal and branch offices other than the Contractor's office at the Site.

3. Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work and charges against the Contractor for delinquent payments.

4. Costs due to the negligence of the Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, the Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, the Contractor shall establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to the Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

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B. *Cash Allowances:*

1. The Contractor agrees that:

   a. The cash allowances include the cost to the Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

   b. The Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*

1. The Contractor agrees that a contingency allowance, if any, is for the sole use of the Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by the Engineer to reflect actual amounts due the Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of the Comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by the Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by the Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. The Owner or the Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. The Bid price of a particular item of Unit Price Work amounts to more than five percent (5%) of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by the Contractor differs by more than twenty-five percent (25%) from the estimated quantity of such item indicated in the Agreement; and

2. There is no corresponding adjustment with respect to any other item of Work; and

3. The Contractor believes that the Contractor is entitled to an increase in the Contract Price as a result of having incurred additional expense or the Owner believes that the Owner is entitled to a decrease in the Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. A mutually acceptable fixed fee; or

2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

   a. For costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be fifteen percent (15%);

   b. For costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent (5%);

   c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of fifteen percent (15%) of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent (5%) of the amount paid to the next lower tier Subcontractor;

   d. No fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

   e. The amount of credit to be allowed by the Contractor to the Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in the Contractor's fee by an amount equal to five percent (5%) of such net decrease; and

   f. When both additions and credits are involved in any one change, the adjustment in the Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

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12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Owner and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where the Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of the Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefore as provided in Paragraph 12.02.A. Delays beyond the control of the Contractor shall include, but not be limited to, acts or neglect by the Owner, acts or neglect of utility owners or other Contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If the Owner, Engineer, Construction Manager or other Contractors or utility owners performing other work for the Owner as contemplated by Article 7, or anyone for whom the Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then the Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. The Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to the Contractor's ability to complete the Work within the Contract Times.

C. If the Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of the Owner, or other causes not the fault of and beyond control of the Owner and the Contractor, then the Contractor shall be entitled to an equitable adjustment in the Contract Times, if such adjustment is essential to the Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be the Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.

D. The Owner, the Engineer, Construction Manager and the Related Entities of each of them shall not be liable to the Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, Construction Managers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Contractor on or in connection with any other project or anticipated project.

E. The Contractor shall not be entitled to an adjustment in the Contract Price or Contract Times for delays within the control of the Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of the Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which the Owner or the Engineer has actual knowledge will be given to the Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. The Owner, the Engineer, their consultants and other representatives and personnel of the Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to

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the Site and the Work at reasonable times for their observation, inspecting, and testing. The Contractor shall provide them proper and safe conditions for such access and advise them of the Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. The Contractor shall give the Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. The Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. For inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. That costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. As otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, the Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish the Engineer the required certificates of inspection or approval.

D. The Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for the Owner's and the Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to the Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to the Owner and the Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by the Contractor without written concurrence of the Engineer, it must, if requested by the Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at the Contractor's expense unless the Contractor has given the Engineer timely notice of the Contractor's intention to cover the same and the Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of the Engineer, it must, if requested by the Engineer, be uncovered for the Engineer's observation and replaced at the Contractor's expense.

B. If the Engineer considers it necessary or advisable that covered Work be observed by the Engineer or inspected or tested by others, the Contractor, at the Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, the Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the Owner shall be

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entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, the Owner may make a Claim therefore as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, the Contractor may make a Claim therefore as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or the Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, the Owner may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, the Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by the Engineer, remove it from the Project and replace it with Work that is not defective. The Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, the Contractor shall take no action that would void or otherwise impair the Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within **one (1) year** after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by the Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, the Contractor shall promptly, without cost to the Owner and in accordance with the Owner's written instructions:

1. Repair such defective land or areas; or

2. Correct such defective Work; or

3. If the defective Work has been rejected by the Owner, remove it from the Project and replace it with Work that is not defective, and

4. Satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting there from.

B. If the Contractor does not promptly comply with the terms of the Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to

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such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by the Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting there from) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of **one (1) year a**fter such correction or removal and replacement has been satisfactorily completed.

E. The Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to the Construction Manager's recommendation of final payment, the Construction Manager) prefers to accept it, the Owner may do so. The Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Construction Managers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) attributable to the Owner's evaluation of and determination to accept such defective Work (such costs to be approved by the Construction Manager as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by the Contractor pursuant to this sentence. If any such acceptance occurs prior to the Construction Manager's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and the Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, the Owner may make a Claim therefore as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by the Contractor to the Owner.

13.09 *Owner May Correct Defective Work*

A. If the Contractor fails within a reasonable time after written notice from the Engineer to correct defective Work or to remove and replace rejected Work as required by the Engineer in accordance with Paragraph 13.06.A, or if the Contractor fails to perform the Work in accordance with the Contract Documents, or if the Contractor fails to comply with any other provision of the Contract Documents, the Owner may, after **seven (7) days** written notice to the Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, the Owner shall proceed expeditiously. In connection with such corrective or remedial action, the Owner may exclude the Contractor from all or part of the Site, take possession of all or part of the Work and suspend the Contractor's services related thereto, take possession of the Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere. The Contractor shall allow the Owner, the Owner's representatives, agents and employees; the Owner's other Contractors, and the Engineer and the Engineer's Consultants access to the Site to enable the Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by the Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against the Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the Owner shall be entitled to an appropriate

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decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, the Owner may make a Claim therefore as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of the Contractor's defective Work.

D. The Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by the Owner of the Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Construction Manager. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least **twenty (20) days** before the date established in the Agreement for each progress payment (but not more often than once a month), the Contractor shall submit to the Construction Manager for review an Application for Payment filled out and signed by the Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect the Owner's interest therein, all of which must be satisfactory to the Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of the Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge the Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. The Construction Manager will, within **ten (10) days** after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to the Owner or return the Application to the Contractor indicating in writing the Construction Manager's reasons for refusing to recommend payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Application.

2. The Construction Manager's recommendation of any payment requested in an Application for Payment will constitute a representation by the Construction Manager to the Owner, based on the Construction Manager's observations on the Site of the executed Work as an experienced and qualified design professional and on the Construction Manager's review of the Application for Payment and the accompanying data and schedules, that to the best of the Construction Manager's knowledge, information and belief:

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a. The Work has progressed to the point indicated;

b. The quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. The conditions precedent to the Contractor's being entitled to such payment appear to have been fulfilled in so far as it is the Construction Manager's responsibility to observe the Work.

3. By recommending any such payment the Construction Manager will not thereby be deemed to have represented that:

a. Inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to the Construction Manager in the Contract Documents; or

b. That there may not be other matters or issues between the parties that might entitle the Contractor to be paid additionally by the Owner or entitle the Owner to withhold payment to the Contractor.

4. Neither the Construction Manager's review of the Contractor's Work for the purposes of recommending payments nor the Construction Manager's recommendation of any payment, including final payment, will impose responsibility on the Construction Manager:

a. To supervise, direct, or control the Work, or

b. For the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. For the Contractor's failure to comply with Laws and Regulations applicable to the Contractor's performance of the Work, or

d. To make any examination to ascertain how or for what purposes the Contractor has used the moneys paid on account of the Contract Price, or

e. To determine that title to any of the Work, materials, or equipment has passed to the Owner free and clear of any Liens.

5. The Construction Manager may refuse to recommend the whole or any part of any payment if, in the Construction Manager's opinion, it would be incorrect to make the representations to the Owner stated in Paragraph 14.02.B.2. The Construction Manager may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in the Construction Manager's opinion to protect the Owner from loss because:

a. The Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. The Contract Price has been reduced by Change Orders;

c. The Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

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d. The Construction Manager has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

1. **Ten (10) days** after presentation of the Application for Payment to Owner with Construction Manager's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. The Owner may refuse to make payment of the full amount recommended by the Construction Manager because:

   a. claims have been made against the Owner on account of the Contractor's performance or furnishing of the Work;

   b. Liens have been filed in connection with the Work, except where the Contractor has delivered a specific bond satisfactory to the Owner to secure the satisfaction and discharge of such Liens;

   c. The Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;

   d. There are other items entitling the Owner to a set-off against the amount recommended; or

   e. The Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If the Owner refuses to make payment of the full amount recommended by the Construction Manager, the Owner will give the Contractor immediate written notice (with a copy to the Construction Manager) stating the reasons for such action and promptly pay the Contractor any amount remaining after deduction of the amount so withheld. The Owner shall promptly pay the Contractor the amount so withheld, or any adjustment thereto agreed to by the Owner and the Contractor, when the Contractor corrects to the Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that the Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. The Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to the Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When the Contractor considers the entire Work ready for its intended use the Contractor shall notify the Owner and the Construction Manager in writing that the entire Work is substantially complete (except for items specifically listed by the Contractor as incomplete) and request that the Construction Manager issue a certificate of Substantial Completion.

B. Promptly after the Contractor's notification, the Owner, Agency, Contractor, and Construction Manager shall make a pre-final inspection of the Work to determine the status of completion. If the Construction Manager does not consider the Work substantially complete, the Construction Manager will notify the Contractor in writing giving the reasons therefore.

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C. If the Construction Manager considers the Work substantially complete, the Construction Manager will deliver to the Owner a Tentative Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. The Owner shall have **seven (7) days** after receipt of the Tentative Certificate during which to make written objection to the Construction Manager as to any provisions of the certificate or attached list. If, after considering such objections, the Construction Manager concludes that the Work is not substantially complete, the Construction Manager will within **fourteen (14) days** after submission of the Tentative Certificate to the Owner notify the Contractor in writing, stating the reasons therefore. If, after consideration of the Owner's objections, the Construction Manager considers the Work substantially complete, the Construction Manager will within said **fourteen (14) days** execute and deliver to the Owner and the Contractor a Definitive Certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as the Construction Manager believes justified after consideration of any objections from the Owner.

D. At the time of delivery of the Tentative Certificate of Substantial Completion, the Construction Manager will deliver to the Owner and the Contractor a written recommendation as to division of responsibilities pending final payment between the Owner and the Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless the Owner and the Contractor agree otherwise in writing and so inform the Construction Manager in writing prior to the Construction Manager's issuing the Definitive Certificate of Substantial Completion, the Construction Manager's aforesaid recommendation will be binding upon the Owner and the Contractor until final payment.

E. The Owner shall have the right to exclude the Contractor from the Site after the date of Substantial Completion subject to allowing the Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to the Substantial Completion of all the Work, the Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which the Owner, the Construction Manager, and the Contractor agree constitutes a separately functioning and usable part of the Work that can be used by the Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. The Owner at any time may request the Contractor in writing to permit the Owner to use or occupy any such part of the Work which the Owner believes to be ready for its intended use and substantially complete. If and when the Contractor agrees that such part of the Work is substantially complete, the Contractor will certify to the Owner and the Construction Manager that such part of the Work is substantially complete and request Construction Manager to issue a certificate of Substantial Completion for that part of the Work.

2. The Contractor at any time may notify the Owner and the Construction Manager in writing that the Contractor considers any such part of the Work ready for its intended use and substantially complete and request the Construction Manager to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, the Owner, the Contractor, and the Construction Manager shall make an inspection of that part of the Work to determine its status of completion. If the Construction Manager does not consider that part of the Work to be substantially complete, the Construction Manager will notify the Owner and the Contractor in writing giving the reasons therefore. If the Construction Manager considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to Certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

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4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from the Contractor that the entire Work or an agreed portion thereof is complete, the Construction Manager will promptly make a final inspection with the Owner, the Agency, and the Contractor and will notify the Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. The Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

1. After the Contractor has, in the opinion of the Construction Manager, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, the Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. All documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

   b. Consent of the surety, if any, to final payment;

   c. A list of all Claims against the Owner that the Contractor believes are unsettled; and

   d. Complete and legally effective releases or waivers (satisfactory to the Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by the Owner, the Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which the Owner or the Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any Lien.

B. *Construction Manager's Review of Application and Acceptance*

1. If, on the basis of the Construction Manager's observation of the Work during construction and final inspection, and the Construction Manager's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, the Construction Manager is satisfied that the Work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Construction Manager will, within **ten (10) days** after receipt of the final Application for Payment, indicate in writing the Construction Manager's recommendation of payment and present the Application for Payment to the Owner for payment. At the same time the Construction Manager will also give written notice to the Owner and the Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, the Construction Manager will return the Application for Payment to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application for Payment.

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C. *Payment Becomes Due*

1. **Thirty (30) days** after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Construction Manager, less any sum Owner is entitled to set off against Construction Manager's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of the Contractor, final completion of the Work is significantly delayed, and if the Construction Manager so confirms, the Owner shall, upon receipt of the Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of the Construction Manager, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by the Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Construction Manager with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims. The remaining balance of any sum included in the final Application for Payment but held by the Owner for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. A waiver of all Claims by the Owner against the Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from the Contractor's continuing obligations under the Contract Documents; and

2. A waiver of all Claims by the Contractor against the Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by the Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, the Owner may suspend the Work or any portion thereof for a period of not more than **ninety (90) consecutive days** by notice in writing to the Contractor and the Engineer which will fix the date on which Work will be resumed. The Contractor shall resume the Work on the date so fixed. The Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if the Contractor makes a Claim therefore as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. The Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

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2. The Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. The Contractor's disregard of the authority of the Construction Manager; or

4. The Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving the Contractor (and surety) **seven (7) days** written notice of its intent to terminate the services of the Contractor:

1. Exclude the Contractor from the Site, and take possession of the Work and of all the Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by the Contractor (without liability to the Contractor for trespass or conversion),

2. Incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere, and

3. Complete the Work as the Owner may deem expedient.

C. If the Owner proceeds as provided in Paragraph 15.02.B, the Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) sustained by the Owner arising out of or relating to completing the Work, such excess will be paid to the Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, the Contractor shall pay the difference to the Owner. Such claims, costs, losses, and damages incurred by the Owner will be reviewed by the Engineer as to their reasonableness and, when so approved by the Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph the Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, the Contractor's services will not be terminated if the Contractor begins within **seven (7) days** of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than **thirty (30) days** of receipt of said notice.

E. Where the Contractor's services have been so terminated by the Owner, the termination will not affect any rights or remedies of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due the Contractor by the Owner will not release the Contractor from liability.

F. If and to the extent that the Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon **seven (7) days** written notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy of the Owner, terminate the Contract. In such case, the Contractor shall be paid for (without duplication of any items):

1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

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3. All claims, costs, losses, and damages (including but not limited to all fees and charges of Engineers, Architects, Attorneys, and other Professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. Reasonable expenses directly attributable to termination.

B. The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of the Contractor, (i) the Work is suspended for more than **ninety (90) consecutive days** by the Owner or under an order of court or other public authority, or (ii) the Engineer fails to act on any Application for Payment within **thirty (30) days** after it is submitted, or (iii) the Owner fails for **thirty (30) days** to pay the Contractor any sum finally determined to be due, then the Contractor may, upon **seven (7) days** written notice to the Owner and the Engineer, and provided the Owner or the Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from the Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if the Engineer has failed to act on an Application for Payment within **thirty (30) days** after it is submitted, or the Owner has failed for **thirty (30) days** to pay the Contractor any sum finally determined to be due, the Contractor may, **seven (7) days** after written notice to the Owner and the Engineer, stop the Work until payment is made of all such amounts due the Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude the Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to the Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. The Owner and the Contractor may mutually request mediation of any Claim submitted to the Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. The Owner and the Contractor shall participate in the mediation process in good faith. The process shall be concluded within **sixty (60) days** of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the claim is not resolved by mediation, the Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding **thirty (30) days** after termination of the mediation unless, within that time period, the Owner or the Contractor:

1. Elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. Agrees with the other party to submit the Claim to another dispute resolution process, or

3. Gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

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ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. Delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. Delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of the Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the State of California.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

A. This Contract is expected to be funded in part with funds provided by the Agency. Neither the Agency, nor any of its departments, entities, or employees is a party to this Contract.

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18.02 *Contract Approval*

A. The Owner and the Contractor will furnish the Owner's attorney such evidence as required so that the Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Contract Document Section 00620) before the Owner submits the executed Contract Documents to the Agency for approval.

B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

A. The Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.

B. The Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in the Contractor. The Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from the Contractor or subcontractors.

18.04 *Gratuities*

A. If the Owner finds after a notice and hearing that the Contractor, or any of the Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the Owner or the Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, the Owner may, by written notice to the Contractor, terminate this Contract. The Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which the Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

B. In the event this Contract is terminated as provided in paragraph 18.04.A, the Owner may pursue the same remedies against the Contractor as it could pursue in the event of a breach of this Contract by the Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, the Owner may pursue exemplary damages in an amount (as determined by the Owner) which shall not be less than three (3) nor more than ten (10) times the costs the Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

A. For all negotiated contracts and negotiated modifications (except those of $10,000 or less), the Owner, the Agency, the Controller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. The Contractor shall maintain all required records for **three (3) years** after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

A. If the Contractor intends to let any subcontracts for a portion of the work, the Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when

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economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) the Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

A. The Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that the Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. The Owner shall report all suspected or reported violations to the Agency.

18.08 *Clean Air and Pollution Control Acts*

A. If this Contract exceeds **$100,000**, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). Contractor will report violations to the Agency and the Regional Office of the EPA.

18.09 *State Energy Policy*

A. The Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

A. If this Contract exceeds **$10,000**, the Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR Part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within **ten (10) working days** of award of any construction subcontract in excess of **$10,000** at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

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18.11 *Restrictions on Lobbying*

A. The Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 349) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed **$100,000** at any tier under a Federal loan that exceeds **$150,000** or a Federal grant that exceeds **$100,000**. If applicable, the Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 34 USC 1354. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by the Owner.

18.12 *Environmental Requirements*

A. When constructing a project involving trenching and/or other related earth excavations, the Contractor shall comply with the following environmental constraints:

1. *Wetlands* – When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert wetlands.

2. *Floodplains* – When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert one-hundred (100) year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.

3. *Historic Preservation* – Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the Owner and a representative of the Agency. Construction shall be temporarily halted pending the notification process and further directions issued by the Agency after consultation with the State Historic Preservation Officer (SHPO).

4. *Endangered Species* – The Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of the Contractor, the Contractor will immediately report this evidence to the Owner and a representative of the Agency. Construction shall be temporarily halted pending the notification process and further directions issued by the Agency after consultation with the U.S. Fish and Wildlife Service.

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22. SUPPLEMENTARY CONDITIONS

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These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract Funding Agency Edition (No. C-710, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof. Every effort has been made to already have incorporated the following into the General Conditions.

SC-1.01.A.4 Add the following language to the end of Paragraph 1.01.A.4:
The Application for Payment form to be used on this Project is EJCDC No. C-620. The Agency must approve all Applications for Payment before payment is made.

SC-1.01.A.10 Add the following language to the end of Paragraph 1.01.A.10:
The Change Order form to be used on this Project is EJCDC No. C-941. Agency approval is required before Change Orders are effective.

SC-1.01.A.20 Add the following language to the end of Paragraph 1.01.A.20:
The Engineer for this project is: **The Holt Group, Inc.** The Engineer's Consultants on this project are:

1) **Geotechnical Engineer –** N/A

2) **Structural Engineer –** N/A

3) **Electrical Engineer –** N/A

4) **Heber Recreation Center –** N/A

SC-2.03.A Delete Paragraph 2.03.A in its entirety and insert the following in its place:

A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within **thirty (30) days** after the Effective Date of the Agreement.

SC-4.02 Add the following new paragraphs immediately after Paragraph 4.02.B:

C. In the preparation of Drawings and Specifications, Engineer relied upon the following reports of exploration and tests of subsurface conditions at the Site:

SC-4.06.D Amend the beginning of Paragraph 4.06.D to read as follows:

If Contractor encounters a Hazardous Environmental Condition or 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, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately:

SC-5.03 Add the following new paragraph immediately after Paragraph 5.03.B:

C. Failure of the Owner to demand such certificates or other evidence of full compliance with these insurance requirements or failure of the Owner to identify a deficiency from evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

SC-5.04 Add the following new paragraph immediately after Paragraph 5.04.B:

C. The limits of liability for insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverage's under paragraphs 5.04.A.1 and A.2 of the General Conditions:

a.	State:	Statutory
b.	Employer's Liability	$1,000,000

2. Contractor's General Liability under paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverage's and eliminate the exclusion with respect to property under the care, custody, and control of the Contractor:

a.	General Aggregate	$2,000,000
b.	Products – Completed Operations Aggregate	$1,000,000
c.	Personal and Advertising Injury	$1,000,000
d.	Each Occurrence (Bodily Injury and Property Damage)	$1,000,000
e.	Excess or Umbrella Liability	$1,000,000

3. Automobile Liability under paragraph 5.04.6 of the General Conditions:

a.	Combined Single Limit	$1,000,000

4. Property Damage liability insurance will provide Explosion, Collapse and Underground (X,C,U) coverage's where applicable.

5. Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall be provided as part of the General Liability coverage.

6. The Owner and Engineer are to be included as additional insureds.

7. Course of Construction Insurance:

Covering all risk of loss, maintained at one hundred percent of the completed value based on the insurable portion of the work, including materials at the project site, stored off the project site, and in transit. The insurable portion of the work is one-hundred percent of the Contract amount. The Contractor's liability for damages proximately caused by acts of God (as defined in Public Contract Code Section 7105) and not involving Contractor negligence shall be limited to five percent of the Contract amount if the work damage is built in accordance with the Contract and applicable building standards.

SC-5.06. Add the following new paragraph immediately after Paragraph 5.06.D:

E. The Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof in accordance with Paragraph 5.06. The following persons or entities are to be included as additional insured on the policy:

SC-6.05.C. Amend the paragraph by making two subparagraphs under the title C.
Engineer's Evaluation. The paragraph text is re-titled, 6.05.C.2 After Effective Date of Agreement. A new paragraph is added before this paragraph to read as follows:

1. *During Bidding:* The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute or materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of the required type, function, and quality to be met by any proposed substitute or "or-equal" item. A request for the Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least **five (5) days** prior to the date for receipt of Bids. No item of material or equipment will be considered by the Engineer as a substitute unless written request for approval has been submitted by the Bidder and has been received by the Engineer at least **fifteen (15) days** prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. The Engineer's decision of approval or disapproval of a proposed item will be final. If the Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. The Bidders shall not rely upon approvals made in any other manner.

2. *After the Effective Date of the Agreement:* The Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. The Engineer may require the Contractor to furnish additional data about the proposed substitute item. The Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until the Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." The Engineer will advise the Contractor in writing of any negative determination.

SC-6.06. Add a new paragraph immediately after paragraph 6.06.G:

H. The Contractor shall not award work valued at more than **thirty five percent (35%)** of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-6.13. Add the following language to the end of paragraph 6.13.B:

For all excavations in excess of five (5) feet, the Contractor shall, pursuant to Labor Code Section 6705, submit in advance of any excavation hereunder a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from caving ground. No such excavation shall be made until said detailed plan is submitted by Contractor and accepted by Engineer.

SC-9.03. Add the following language at the end of paragraph 9.03:

The Duties, Responsibilities, and Limitations of Authority of the Resident Project Representative will be stated in the Agreement for Engineering Services executed for this specific Project.

SC-10.05. Add the following new paragraph immediately after paragraph 10.05.F:

G. If this is a "Public Works Contract" as defined in Section 22200 of the California Public Contract Code, claims shall be resolved pursuant to Sections 20104 et seq. of the California Public Contract Code. These sections are summarized as follows:

1. Claim means a separate demand by the Contractor for (a) a time extension, (b) payment of money or damages arising from work done by, or on behalf of the contractor, pursuant to this Contract, payment not otherwise expressly provided the Contract, or (c) any separate demand by the Contractor, the amount of which is disputed by the Owner.

2. For claims less than $50,000, the Owner shall respond in writing to all written claims within **forty-five (45) days** of receipt of the claim, or may request in writing, within **thirty (30) days** of receipt of the claim, any additional documentation supporting the claim or relating to any defenses the Owner may have against such claim. The Owner's written response to the claim, as further documented, will be submitted to the Contractor within **fifteen (15) days** from receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional documentation, whichever is greater.

3. For claims over $50,000 and less than or equal to $375,000, the Owner shall respond in writing to all written claims within **sixty (60) days** of receipt of the claim, or may request in writing, within **thirty (30) days** of receipt of the claim, any additional documentation supporting the claim or relating to any defenses the Owner may have against such claim. The Owner's written response to the claim, as further documented, will be submitted to the Contractor within **thirty (30) days** from receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional documentation, whichever is greater.

4. If the Contractor disputes the Owner's written response, or the Owner fails to respond within the time specified, the Contractor may notify the Owner in writing within either **fifteen (15) days** of receipt of the Owner's response, or within **fifteen (15) days** of the Owner's failure to respond within the statutorily prescribed time, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon demand, the Owner shall schedule a meet and confer conference within **thirty (30) days** for settlement of the dispute.

5. Following the meet and confer conference, if the claim or any portion remains in dispute, the Contractor may file a claim pursuant to Government Code Sections 900, et seq. The period of time within to file such a claim shall be defined in Public Contract Code Section 20104.2(e).

SC-14.02.A.3 Add the following language at the end of paragraph 14.02.A.3:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

SC-14.02.C.1. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:

1. **Thirty (30) days** after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

SC-14.07.C Delete Paragraph 14.07.C1 in its entirety and insert the following in its place:

1. **Thirty-five (35) days** after the filing of a Notice of Completion with the County Recorder and after presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

SC-18.08 Delete paragraph 18.08.A in its entirety and insert the following in its place:

A. If this Contract exceeds **$100,000**, the Contractor shall comply with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 USC §1857(h)), Section 508 of the Clean

Water Act (33 USC §1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

SC-20 Add the following new paragraphs:

ARTICLE 20 - ADDITIONAL STATE REQUIREMENTS

20.01 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 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 tenders final payment to the Contractor, without further acknowledgment by the parties.

20.02 Unless otherwise indicated in the Contract Documents, all utility lines, conduits, wires, or structures shall be maintained by the Contractor and shall not be disturbed, disconnected, or damaged by him during the progress of the Work, provided, that should the Contractor in the performance of the Work disturb, disconnect, or damage any of the above, all expenses arising from such disturbance or in the replacement or repair thereof shall be borne by the Contractor. However, in accordance with Section 4215 of the California Government Code, the Contractor shall be compensated for all costs of locating and repairing damage to main or trunkline utility facilities located on the work site and for costs of operating equipment on the work site necessarily idled during such work where the Contractor has exercised reasonable care in removing or relocating utility facilities which are inaccurately indicated in the Contract Documents.

21. SPECIAL CONDITIONS

SECTION	DESCRIPTION	
1	Project Description	00840-2
2	Heber Recreation Center – Building Permit	00840-3
3	Inspection of Work	00840-4
4	Surplus Native Material Export	00840-6
5	Air Pollution Control District Requirements	00840-7
6	Electrical Power and Telephone Service Coordination	00840-8
7	Temporary Construction Sign for Project	00840-9

1. Project Description

Heber Public Utility District (HPUD) proposes to construct a Recreational Center for the unincorporated community of Heber in Imperial County. The Recreational Center is proposed to be constructed and operated in the existing lot owned by HPUD (a publicly owned special district). HPUD's resources are limited and would like to make this project work at this location to provide residents with needed recreational opportunities.

The project site is zoned R-1 (low density residential) which allows for publicly owned recreational facilities. The project site consists of a 65 feet by 110 feet rectangular lot at 156 Littlefield Way, Heber , CA 92249 (APN 054-601-001). The lot is located within the Heber Meadows Subdivision. The lot (corner lot) and is bounded by Littlefield Way on the south, existing residential single family dwelling unit to the east, undeveloped empty lot to the north, and Bloomfield Street to the west. The lot is currently vacant, but was previously used as a parking lot for visitors of the Heber Meadows Subdivision's home sales office.

The existing lot is empty with native soil, a deteriorated asphalt parking lot, and has minor landscaping shrubs. The lot has a water service connection that is in operation, and sewer service hook-up connection. The lot has the capability for power and communication utilities. The lot has wood fencing surrounding the east, north, and west sides of the property. The lot has existing sidewalk on the west side along Bloomfield Street and south side along Littlefield Way. The lot has an existing driveway along Littlefield Way, which is the proposed driveway entrance to the Recreational Center Building.

The construction project will include the minor demolition, grading, and construction of a metal building to serve as the Recreational Center Building. The project will require demolition of the existing asphalt parking lot, bollards, and existing landscape shrubs. The existing lot will be graded to accommodate the proposed metal building, sidewalk areas, driveway, new asphalt parking lot area, and new landscaping.

The proposed metal building will be 40-feet by 40-feet (1,600 square feet) and will include a large main room with partitioned office, storage room, and restroom facilities. The front of the building will face westerly, towards Bloomfield Street. The contractor will be required to provide all of the building's (including the foundation) design drawings and calculations to meet the current building code requirements. The contractor will be responsible for securement of the Building Permit through the County of Imperial's Planning and Development Services Department.

A pedestrian sidewalk is to be construed from Littlefield Way to the building. The existing driveway along Littlefield Way will lead to five (5) parking spaces, in which one (1) of space is ADA compliant.

The existing water service and sewer service utilities are to be extended and connected to each perspective facility within the building. New power service and communication service utilities are to be installed for the building. New landscaping is to be placed throughout the lot.

END OF SECTION

2. Heber Public Utility District Recreation Center – Building Permit

A Building Permit Application with the accompanying applicable Improvement Plans for the construction of the Heber Public Utility District Recreation Center is to be forwarded to the County of Imperial Planning and Development Services' Building Department during the submittal phase. The Heber Public Utility District shall incur all costs with regard to the Building Permit Application and review process. The Heber Public Utility District shall compensate the Contractor for the cost of the Building Permit fee, including the County of Imperial Building Department inspections and submittal reviews during the construction phase of the project.

END OF SECTION

3. Inspection of Work

3.1. All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the Contract Documents.

3.2. The Contractor shall provide all inspection and testing services including all geotechnical inspection and testing services unless specified to be provided by the Owner. The Contactor shall pay for all costs relative to the Geotechnical Testing and include the costs in the Proposal (Bid Form). See the following Technical Specification Sections for earthwork, concrete, asphalt and mortar testing requirements:

1. Earthwork – Technical Specification 02200, Part 3 – Execution - 3.10 Compaction Test Schedule.
2. Concrete – Technical Specification 03300.1.05 on Page 03300-4.
3. Asphalt – Section 02510.3.01

3.3. The Construction Manager shall provide at the Contractor's expense the testing and inspection services required by the Contract Documents if the Contractor fails or refuses to provide the required testing and inspection services.

3.4. If the Contract documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested, or approved by someone other than the Construction Manager, the Contractor will give the Construction Manager timely notice of readiness. The Contractor will then furnish the Construction Manager the required certificates of inspection, testing or approval.

3.5. Inspections, tests, or approvals by the Construction Manager or others shall not relieve the Contractor from the obligations to perform the work in accordance with the requirements of the Contract Documents.

3.6. The Construction Manager and the Construction Manager's representative will at all times have access to the work. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records on personnel, invoices of materials, and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the work and also for any inspection or testing thereof.

3.7. If any work is covered prior to inspection by the Construction Manager it must, if requested by the Construction Manager, be uncovered for the Construction Manager's observation and replaced at the Contractor's expense.

3.8. If the Construction Manager considers it necessary or advisable that covered work be inspected or tested by others, the Contractor, at the Construction Manager's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Construction Manager may require, that portion of the work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation,

inspection and testing and of satisfactory reconstruction. If, however, such work is not found to be defective, the Contractor will be allowed an increase in the contract price or any extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and construction and an appropriate change order shall be issued.

3.9. These Special Conditions supplement the General Conditions, Technical Specifications, and Plans. All requirements and provisions of the General Conditions, Technical Specifications and Plans apply. Where codes, procedures, conditions, specifications, and requirements conflict, the most stringent shall apply. If there is a question or conflict regarding responsibility of costs, it shall be assumed and required the Contractor be responsible for the cost of any particular item or work requirement and it shall be assumed the Contractor has included the costs in the Bid Cost.

END OF SECTION

4. Surplus or Import Native Material

Surplus native material excavated for the construction of the project shall be removed and disposed of by the Contractor or imported to the project site as required by the Contractor. The costs relative to the import or export of native material shall be included in the Contractor's Proposal (Bid Form).

END OF SECTION

5. Air Pollution Control District Requirements

The Contractor shall be responsible for abiding with the latest edition of Regulation VIII set forth by Imperial County Air Pollution Control District.

The Contractor shall also be responsible for preparation and submission of a Construction Notification Form and Dust Control Plan to the County of Imperial Air Pollution Control District. The Construction Notification Form and Dust Control Plan shall also be posted at the Project Site. A copy of the Construction Notification Form and Dust Control Plan follow Regulation VIII within this document.

The Imperial County Air Pollution Control District contact information is:

150 South Ninth Street
El Centro, CA 92243
Phone: 760-482-4606
Fax: 760-353-9904
http://www.imperialcounty.net/AirPollution/

The Contractor is to include the costs associated with the Air Pollution Control District requirements in the Proposal (Bid Form – Basis of Bid – Schedule of Values).

END OF SECTION

6. Electrical, and Telephone Service Coordination

The Contractor shall be responsible for coordinating the submission of the Customer Service Proposal (CSP) application to the Imperial Irrigation District (IID) Energy Department. The Contractor shall monitor the processing of the Customer Service Proposal and the preparation of the Electrical Plans by the IID Energy Department. The Contractor shall incur all costs with regard to the Electrical Plan preparation of the Building.

Heber Public Utility District shall incur all costs with regard to the CSP Application, IID Electrical connection, IID installation fees, and any other IID fees associated with supplying the electrical power service for the Recreation Center.

The Contractor shall coordinate the installation of telephone and alarm services for the Recreation Center with AT&T and Spectrum. The Heber Public Utility District shall incur all costs with regard to the AT&T and Spectrum, connection fees and any other utility purveyor fees associated with the installation of the telephone and alarm systems.

END OF SECTION

7. Temporary Construction Sign for Project

The Contractor shall fabricate, install and maintain a Temporary Construction Sign (Project Sign). The project sign shall be provided as a submittal prior to fabrication. The project sign shall include the following:

- The Project Sign shall be placed on a white background with black lettering.
- The Project Sign shall include logo of HPUD.
- The Project Sign is to be mounted on a 8’ x 4’ plywood or metal sheet.
- The Project Sign is to be mounted on a 4” x 4” posts or equivalent strength posts.
- The Project Sign shall be placed at the front of the Project Site for public to view.
- The Project Sign shall include the following information.
    - Name of Project
    - Owner’s Logo
    - Funding By:
    - Funding Agency’s Logo:
    - Contractor’s Name.

TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

01070	ABBREVIATIONS
01090	REFERENCE STANDARDS
01300	CONTRACTOR SUBMITTALS
01312	PROJECT MEETINGS
01505	MOBILIZATION
01520	TEMPORARY FACILITIES
01530	PROTECTION OF EXISTING FACILITIES
01550	SITE ACCESS AND STORAGE
01560	PROJECT ENVIRONMENTAL CONTROLS
01600	MATERIALS AND EQUIPMENT
01700	PROJECT CLOSEOUT
01722	SURVEYING
01783	AS-BUILTS

DIVISION 2 - SITEWORK

02050	DEMOLITION AND SALVAGE
02150	SHEETING, SHORING AND BRACING
02200	EARTHWORK
02221	TRENCHING, BACKFILLING AND COMPACTING
02600	PAVEMENT MARKINGS AND PAINTED

	TRAFFIC STRIPES
02640	PVC PIPE

DIVISION 3 - CONCRETE

03100	CONCRETE FORMWORK
03200	REINFORCEMENT STEEL
03220	UNDERSLAB VAPOR BARRIER
03290	JOINTS IN CONCRETE STRUCTURES
03300	CAST-IN-PLACE CONCRETE
03345	CONCRETE FINISHING

DIVISION 4 - MASONRY

NOT USED

DIVISION 5 - METALS

05120	STRUCTURAL STEEL
05220	CONCRETE BOLTS
05400	LIGHT METAL FRAMING
05521	ALUMINUM RAILINGS

DIVISION 6 – WOOD AND PLASTICS

06410	CUSTOM CASEWORK
06600	PLASTIC SURFACING MATERIALS

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07120	WATERPROOFING & DAMPPROOFING
07210	THERMAL INSULATION
07251	WEATHER BARRIERS
07550	STANDING STEAM METAL ROOF
07600	FLASHING AND SHEET METAL
07711	GUTTER SYSTEM
07840	FIRESTOPPING
07900	CAULKING & SEALANTS

DIVISION 8 – DOORS AND WINDOWS

08100	METAL DOORS & FRAMES
08200	WOOD DOORS & FRAMES
08500	ALUMINUM WINDOWS
08710	FINISH HARDWARE
08800	GLAZING

DIVISION 9 - FINISHES

09250	GYPSUM BOARD SYSTEMS
09510	ACOUSTICAL CEILING SYSTEM
09650	VINYL COMPOSITION TILE FLOORING
09653	RUBBER WALL BASE
09680	CARPET

09770	FRP – GLASS FIBER REINFORCED PLASTIC PANELING
09900	PAINTING

DIVISION 10 – SPECIALTIES

10200	LOUVERS
10400	IDENTIFYING DEVICES
10520	FIRE PROTECTION SPECIALTIES
10530	EXTERIOR AWNING SYSTEM
10800	TOILET AND BATH ACCESSORIES

DIVISION 11 - EQUIPMENT

11000	EQUIPMENT GENERAL PROVISIONS

DIVISION 15 - MECHANICAL

15400	PLUMBING
15600	HVAC

DIVISION 16 – ELECTRICAL

16000	ELECTRICAL
16721	FIRE ALARM SYSTEM

SECTION 01070 - ABBREVIATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Wherever in these Contract Documents the following abbreviations or acronyms are used, they shall have the meanings indicated as follows:

1.02 ABBREVIATIONS AND ACRONYMS

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of the State Highway and Transportation Officials
A2LA	American Association of Laboratory Accreditation
A.C.	Asphalt Concrete
ACI	American Concrete Institute
ADA	American Disabilities Act
ADWR	California Division of Water Resources
AGC	Associated General Contractors
AGMA	American Gear Manufacturer's Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute, Inc.
AOS	Apparent Opening Size
APA	American Plywood Association
API	American Petroleum Institute
APN	Assessor's Parcel Number
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Society for Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturer's Association
CBC	California Building Code
CBR	California Bearing Ratio
CDX	Apa Rated Plywood Sheathing Exposure
CGA	Compressed Gas Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
ETL	Electrical Test Laboratories
ETL	Extract, Transform Load

EPDM	Ethylene Propylene Diene M-Class
FHWA	Federal Highway Administration
GAI	Geosynthetic Accreditation Institute
GCP	Construction General Permit
GPM	Gallons per Minute
GRI	Geosynthetic Research Institute
HDPE	High Density Polyethylene
HPC	Heterotrophic Plate Count
HPUD	Heber Public Utility District
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IID	Imperial Irrigation District
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
ISA	Instrument Society of America
LAP	Laboratory Accreditation Program
LLDPE	Linear Low Density Polyethylene
MARV	Minimum Average Roll Value
MD	Machine Direction
MGD	Million Gallons per Day
MPA	Mega Pascal
MBMA	Metal Building Manufacturer's Association
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NGLI	National Lubricating Grease Institute
No.	Number
NOI	Notice of Intent
NOT	Notice of Termination
NSF	National Sanitation Foundation
NTPEP	National Transportation Product Evaluation Program
OD	Outside Diameter
OEM	Original Equipment Manufacturer
OIT	Oxidative Induction Time
OS&Y	Outside Stem and York
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCC	Portland Concrete Cement
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
SBR	Styrene Butadiene Rubber
SCH	Schedule
SDR	Standard Dimension Ratio
SMA	Screen Manufacturer's Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPDT	Single Pole-Double Throw
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SWPPP	Storm Water Pollution Prevention Plan
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.

USEPA	United States Environmental Protection Agency
UV	Ultra-Violet Disinfection
WCRSI	Western Concrete Reinforcing Steel Institute
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association
XMD	Cross Machine Direction

1.03 PLAN SHEET ABBREVIATIONS

%	Percent
AASHTO	American Association of State Highway and Transportation Officials
A.C.	Asphalt Concrete
A.C.P.	Asbestos Cement Pipe
AC-FT	Acer Feet
ADA	American Disabilities Act
Agg.	Aggregate
AOS	Apparent Opening Size
APP	Approximate
ASTM	American Society for Testing and Materials
AVE	Average
AWWA	American Water Works Association
BC	Beginning of Curve
BLDG.	Building
BTM	Bottom
B.V.	Butterfly Valve
C2B	Class 2 Base
CC	Cubic Centimeter
C.I.	Cast Iron
CIRC	Circumferential
CL	Centerline
CLR	Clear
C.M.C.	Cement Mortar Coated
C.M.L.	Cement Mortar Lined
CPVC	Chlorinated Polyvinyl Chloride
D.I.	Ductile Iron
DIA	Diameter
DWG	Drawing
D/W	Driveway
Δ	Delta
EC	End of Curve
EF	Each Face
EL.	Elevation
E.P.	Edge of Pavement
EPDM	Ethylene Propylene Diene M-Class
EW	Each Way
FF	Finish Floor Elevation
FG	Finished Grade
F_L	Flowline
FL.	Flanged
F.M.	Flow Meter
FM	Force Main
FS	Finish Surface
GALV	Galvanized
GPH	Gallons per Hour
GPM	Gallons per Minute
GW	Ground Water

H.B.	Hose Bib
HDPE	High Density Polyethylene
HP	Horsepower
HPUD	Heber Public Utility District
HW	High Water
I.D.	Inside Diameter
INV. EL.	Invert Elevation
INV.	Invert
IPS	Iron Pipe Size
L.	Length
LBS	Pounds
MAX.	Maximum
MG	Million Gallon
MGD	Million Gallons per Day
M.H.	Manhole
MIN.	Minimum
MISC.	Miscellaneous
M.J.	Mechanical Joint
MPH	Miles per Hour
N. RIM	North Rim
N.S.	Native Surface
N.T.S.	Not To Scale
O.C.	On Center
O.D.	Outside Diameter
OHC	Overhead Cable
OHE	Overhead Electric Line
OHT	Overhead Telephone Line
OS&Y	Outside Stem & York
P.C.C.	Portland Concrete Cement
P.E.	Plain End
PL	Property Line
P.P.	Power Pole
PP#	Power Pole Number
PPM	Parts per Million
PSI	Pounds per Square Inch
PT	Pressure Transmitter
PVC	Polyvinyl Chloride
P/S	Prestressing
R.C.	Reinforced Concrete
ROW	Right-of-Way
S.	Slope
SCH	Schedule
SCHED	Schedule
SD	Storm Drain
SDFM	Storm Drain Force Main
SDR	Standard Dimension Ratio
SQ	Square
SS	Sanitary Sewer
SST	Stainless Steel
STA	Station
S/W	Sidewalk
SWPPP	Storm Water Pollution Prevention Plan
TBD	To Be Determined
TBM	Temporary Benchmark
T.C.	Top of Curb or Top of Concrete
TDH	Total Dynamic Head

TF	Top of Footing
TMH	Top of Manhole
TOE	Top of Slope
TOF	Top of Floor
TOW	Top of Wall
T.P.	Top of Pavement
TV	Television
TYP.	Typical
UE	Underground Electricity
UNO	Unless Noted Otherwise
UT	Underground Telephone
VERT	Vertical

END OF SECTION 01070

SECTION 01090 - REFERENCE STANDARDS

PART 1 - GENERAL

1.01 DESCRIPTION

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

1.02 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. All work specified herein shall conform to or exceed the requirements of the referenced specifications, codes and standards to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications.

B. References herein to "Building Code" or UBC shall mean the Uniform Building Code of the International Conference of Building Officials (ICBO). The latest edition of the code, as of the date of award, as approved and adopted by the agency having jurisdiction, including all addenda, modifications, amendments or other lawful changes thereto, shall apply to the Work.

C. References herein to American Water Works Association or AWWA shall comply with the latest edition of the code, as of the date of award.

D. In case of conflict between codes, reference standards, drawings and other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The contractor shall bid the most stringent requirements.

E. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards and specifications listed herein; except, that wherever references to "Standard Specifications" are made, the provisions therein for measurement and payment shall not apply.

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

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

H. All materials and equipment appurtenances that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

I. References in the Contract Documents to "Standard Specifications" shall mean the Greenbook, formally known as the "Standard Specifications for Public Works

Construction" as published by the American Public Works Association, including all current supplements, addenda and revisions thereof, latest edition.

END OF SECTION 01090

SECTION 01300 - CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION

A. All submittals by the Contractor shall be submitted to the Construction Manager at the Site. The Construction Manager may submit the submittals to the Design Engineer if required as authorized by the Owner. The Construction Manager will forward the approved submittals to the Owner.

B. Within ten (10) days after the date of Notice to Proceed, the Contractor shall submit the following items to the Construction Manager:

1. A Construction Schedule providing the starting and completion dates of the various stages of the Work. The Contractor shall be prepared to discuss its construction schedule at the pre-construction conference.

2. Schedule of Values or lump sum price breakdown for progress payment purposes.

C. Equipment submittals shall comply with Section 01660 – Mechanical Equipment – Installation and Start-Up

1.02 SUBMITTAL REQUIREMENTS AND PROCESS

A. The Contractor shall prepare a detailed list of required submittals required for the HPUD Recreation Center within ten (10) days of receiving the Notice to Proceed. The Construction Manager will review and forward comments regarding the submittal list to the contractor within ten (10) days after receiving the list. The Owner shall also review and offer comments regarding the submittal list. The Construction Manager shall insure the submittal list for the HPUD Recreation Center is approved within 10 days after the issuance of the Notice to Proceed.

B. Wherever called for in the Contract Documents or when requested by the Construction Manager, the Contractor shall furnish to the Resident Project Representative for review, six (6) copies of each submittal.

C. All submittals shall be accompanied by a submittal transmittal form. This form may be obtained from the Construction Manager. A separate transmittal form shall be used for each specific item for which a submittal is required. Each submittal should be referenced to the specification section requiring the submittal. All Contractor submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the Construction Manager. Each submittal shall be dated, signed and certified by the Contractor as being correct and in strict conformance with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed and certified. No consideration for review by the Construction Manager of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer and any delays caused thereby shall be the sole responsibility of the Contractor.

D. Multiple-page submittals shall be collated into sets with each set stapled or bound.

E. The Construction Manager will return copies of each submittal to the Contractor with review comments within fifteen (15) calendar days following their receipt by the Resident Project Representative. There will be three (3) copies of a submittal returned to

the Contractor when marked either "NO EXCEPTIONS TAKEN" or "APPROVED AS NOTED", and no formal revision and re-submission of said submittal will be required. However, if one or more copies of the submittal are returned to the Contractor marked 'REVISE AND RESUBMIT" or 'REJECTED", the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Construction Manager.

F. Fabrication of an item shall commence only after the Engineer has reviewed the submittal and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "APPROVED AS NOTED". Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.

G. The Engineer's review of Contractor's submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in the Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.

1.03 CONTRACTOR'S SCHEDULE SUBMITTAL

A. The Contractor shall submit to the Resident Project Representative a construction schedule for the Work showing a general plan for orderly progression of the Work including mobilization of plant and equipment and timing of procurement of major materials and equipment.

B. The Construction Manager may request that the Contractor provide a revised or updated Construction Schedule if, at any time, the Construction Manager considers the completion date to be in jeopardy because of any portion of the Work falling behind schedule or the sequence of operations becomes different from the previous schedule.

1.04 PROPOSED SUBSTITUTES OR "OR EQUAL" ITEM SUBMITTAL

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance and quality required. Other items of material or equipment, or material or equipment of other Suppliers may be submitted to the Engineer for review under the circumstances described below subject to the *Instruction to Bidders* (Section 2, Article 11), *Standard General Conditions* (Article 6.05), and the following requirements:

1. The Contractor shall be responsible for resultant changes and all additional costs or credit to the Owner which the accepted substitution requires in the Contractor's work, the work of its subcontractors and of other contractors and shall effect such changes without cost to the Owner.

B. The procedure for review by the Engineer will include the following:

1. If proposed substitute material or equipment has been judged to be unacceptable by the Engineer, the Contractor shall provide the material or equipment named in the Contract Documents.

1.05 SAMPLES SUBMITTAL

A. The Contractor shall submit not less than two (2) samples, unless noted otherwise in a material or equipment specification, to the Engineer for acceptance at no additional cost to the Owner. Samples shall be submitted for acceptance a minimum of ten (10) days prior to ordering such material for delivery to the job site. If accepted by the Engineer, one (1) set of samples will be returned to the Contractor and one (1) set of samples shall remain at the job site until completion of the Work.

1.06 OPERATION, MAINTENANCE AND TECHNICAL MANUAL SUBMITTAL

A. The Contractor shall furnish operation, maintenance and technical manuals for provided mechanical equipment.

B. All technical manuals shall be submitted to the Engineer not later than the seventy-five percent (75%) of construction completion date or fourteen (14) days prior to start-up of equipment if started before seventy-five percent (75%) completion of project. All discrepancies found in the technical manuals shall be corrected by the Contractor within thirty (30) days from the date of written notification by the Engineer.

1.07 AS-BUILT SUBMITTAL

A. The Contractor shall maintain, during the progress of the Work, one (1) set of As-Built Drawings and shall neatly mark on them all project changes from the details shown on the original Contract Drawings. Special attention shall be given to recording on the drawings the horizontal and vertical location of all buried utilities that differ from the locations indicated or which were revealed during the construction.

B. As-Built drawings shall be accessible to the Construction Manager at all times during the construction period and shall be delivered to the Construction Manager and the Design Engineer upon completion of the Work.

C. Upon substantial completion of the Work and prior to final acceptance the Contractor shall deliver a complete set of As-Built drawings to the Engineer.

1.08 SUPERINTENDENT SUBMITTAL

A. A letter designating the Project Superintendent shall be forwarded to the Construction Manager for his review. The letter shall also include emergency contact information for the Project Superintendent and other Contractor Representative.

1.09 MATERIAL AND EQUIPMENT SUBMITTAL LIST

1. General Requirements

1.1 Construction Schedule

1.2 Schedule of Values

1.3 Letter Designation Project Superintendent

1.4 Emergency Contact Number

1.5 Operation and Maintenance Manuals

1.6 Signs, traffic control devices, cones, barricades and all other items required per the Traffic Control Plan

1.7 Project Identity and Construction Signs

1.8 Contractor to forward a complete submittal list for the HPUD Recreation Center Building to the Construction Manager, and Owner.

END OF SECTION 01300

SECTION 01312 - PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Required to enable orderly review during pre-installation conference and progress of the Work, and to provide for systematic discussion of installation problems and other construction problems arisen, the Construction Manager will conduct project meetings throughout the construction period.

1.02 RELATED WORK SPECIFIED ELSEWHERE

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Division 1 - General Requirements.

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

1.03 SUBMITTALS

A. Conform to provisions of Section 01300 – Contractor Submittals of the Technical Specifications.

B. Agenda Items:

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

C. Minutes:

1. The Construction Manager will compile minutes of each project meeting and will furnish one copy to the Contractor, Resident Project Representative, and all other involved parties.

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

1.04 QUALITY ASSURANCE

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

PART TWO - PRODUCTS (NOT APPLICABLE)

PART THREE - EXECUTION

3.01 MEETING SCHEDULE

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

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

3.02 MEETING LOCATION

A. The Construction Manager will establish the meeting location. To the maximum extent practicable, meetings will be held in Contractor's office at the Site.

3.03 PRECONSTRUCTION MEETING

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

1. Provide attendance by authorized representatives of the Contractor and major Subcontractors.

2. The Construction Manager will advise other interested parties.

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

1. Organizational arrangement of Contractor's forces and personnel, and those of the subcontractors, and materials suppliers.

2. Organizational arrangement of the Owner's forces and personnel and other authorized representatives.

3. Channels and procedures for communication.

4. Construction Schedule, including sequence of events and critical work.

5. Contract Documents, including distribution of required copies of original Documents and revisions.

6. Processing of Shop Drawings and other data submitted to the Construction Manager for review.

7. Processing of bulletin, addenda, field decisions, Requests for Information and Change Orders.

8. Rules and regulations governing performance of the Work.

9. Procedures for site security, project quality control, housekeeping, and related matters.

10. It is the responsibility of the Contractor for Site Safety & First Aid; however, it shall be on the agenda.

11. Procedures for contractor's request.

12. Emergency Information: The name, addresses, telephone and fax numbers of the Contractor, and Subcontractors, or their representatives, shall be filed with the Construction Manager prior to start of the Work.

3.04 PROJECT MEETINGS

A. Attendance:

1. To the maximum extent practicable, the Project Superintendent and other representatives who have full knowledge of the project and full authority to act for the Contractor shall represent the Contractor at Project Meetings throughout the progress of the Work.

2. Subcontractors, materials suppliers, and others may be invited to attend these Project Meetings in which their aspect of the Work is involved.

3. The Contractor may not cancel or be absent from any meeting without advanced approval from the Construction Manager. The Contractor must submit a written request with reason to the Construction Manager twenty-four (24) hours before the scheduled meeting. If approved, the Contractor shall notify all parties of the cancellation.

B. Minimum Agenda:

1. Review progress of the Work since last meeting. Review actual starts and finish dates of activities.

2. Review status (total complete and outstanding) of submittal for approval, Request for Information and Change Orders.

3. Identify old and new problems, which impede planned progress**,** identify responsible party for the follow-up actions. Mutually agree to a common solution and date of correction.

4. Develop corrective measures and procedures to regain lost time on the planned schedule.

5. Review Bi-weekly Progress Reports including the forecasts.

6. Status of As-Builts.

7. Project site Walk-Through. Record all discussion and follow-up actions.

8. Any project site health and/or accident or safety issues.

3.05 SPECIFIC SITE MEETINGS

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

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

C. The Contractor or The Contractor's authorized representative shall be present at all times.

All discussion and follow-up actions shall be recorded by the Construction Manager, and the minutes shall be distributed at the next meeting or at earliest time

END OF SECTION 01312

SECTION 01505 - MOBILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Mobilization shall include obtaining all permits; moving plant equipment on-site; furnishing and erecting plants, temporary buildings and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to, the following principal items:

1. Moving on to the site, Contractor's equipment and materials required for first month operations.

2. Installing temporary construction power, wiring and lighting facilities.

3. Establishing fire protection equipment and instructing designated personnel in the operation of such apparatus.

4. Providing all on-site Contractor communication facilities.

5. Providing on-site Contractor's sanitary facilities.

6. Arranging and setting up the Contractor's work and storage yard.

7. Obtaining all required permits.

8. Posting all OSHA required notices and establishment of safety programs.

9. Have Contractor's superintendent at the Site full time.

10. Submittal of Construction Schedule.

11. Submittal of Schedule of Values

12. Install Project Sign, by the Standard General Conditions, Article 19.

13. Costs of Insurance, Payment Bond, Performance Bond, Taxes, Permits, Freight and similar expenses.

1.02 PAYMENT FOR MOBILIZATION

A. Payment for Mobilization, as noted in the Proposal Forms and approved Schedule of Values, shall not be released to the Contractor unless all items in Paragraph "A" above have been satisfied.

END OF SECTION

SECTION 01520 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

The Owner shall bear no costs of temporary facilities, unless noted otherwise.

It shall be the Contractor's responsibility to provide equipment that is adequate for the performance of the Work under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required Work and shall be subject to inspection and approval by the Owner's representative at any time within the duration of the Contract. All work hereunder shall conform to the applicable requirements of the OSHA Standards for Construction.

1.02 POWER AND LIGHTING

The Contractor shall provide temporary electric power as necessary for the execution of the Work, including that required by all Subcontractors. Contractor shall make the necessary arrangements with utility purveyor to include all permits, applications and fees, and shall bear all costs for these temporary services and shall furnish and install all necessary transformers, metering facilities and distribution centers from branch circuits as may be required.

The Contractor shall provide lighting and outlets in temporary structures throughout the Project as may be required for safety, proper performance and inspection of the Work. If operations are performed during hours of darkness, or if natural lighting is deemed insufficient by Engineer, the Contractor shall provide adequate floodlights, clusters and spot illumination. The use of permanently installed lighting fixtures, lamps and tubes for work shall not be permitted except by special permission of Engineer. The Contractor shall make arrangements with Subcontractors for electrical services and lighting as may be necessary in the performance of their work.

1.03 WATER SUPPLY

A. General: The Contractor shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes. Potable water shall be furnished by the Owner without charge.

B. Drinking Water: All drinking water on the site during construction shall be furnished by the Contractor and shall be bottled water or water furnished in approved dispensers. Notices shall be posted conspicuously throughout the site warning the Contractor's personnel that piped water for construction purposes may be contaminated and is not for human consumption.

C. Water Connections: The Contractor shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission, in writing, of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the water system. For each such connection made the Contractor shall first attach to the fire hydrant or pipeline a valve, backflow preventer and a meter, if required by the said authority, of a size and type acceptable to said authority and agency.

D. Removal of Water Connections: Before final acceptance of the Work all temporary water connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the Engineer and to the agency owning the affected utility.

E. Fire Protection: The Contractor shall provide fire extinguishers and other fire protection equipment to adequately protect new and existing facilities and temporary facilities against damage by fire. Hose connections and hose, water casks, chemical equipment or other sufficient means shall be provided for fighting fires in the new, existing and temporary structures and other portions of the Work and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The Contractor's fire protection program shall conform to the requirements of the OSHA Standards for Construction. The Contractor shall employ every reasonable means to prevent the hazard of fire.

1.04 CONSTRUCTION OFFICE TRAILER

Not Applicable

1.05 SANITATION

A. Toilet Facilities: Portable chemical toilet facilities shall be provided wherever needed for the use of employees. Toilets at Site(s) shall conform to the requirements of Subpart "D", Section 1926.51 of the OSHA Standards for Construction. The Owner's toilet facilities shall not be used by the Contractor. Two (2) toilet facilities shall be positioned at the project site. One (1) toilet facility shall be for men. The other toilet facility shall be for women. Toilet facilities shall be relocated as required and be maintained close to daily work activities. The toilet facilities shall be cleaned and serviced on a weekly basis.

B. Sanitary and Other Organic Wastes: The Contractor shall establish adequate and regular collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto. Contractor may install temporary piping for toilet facilities to discharge into the incoming sewer.

1.06 COMMUNICATIONS

A. Telephone Services: The Contractor shall provide and maintain a phone line.

1.07 FENCE AND BARRICADES

The Contractor shall provide such protective fences and barricades as deemed necessary for public safety and to protect storage areas and the Work in place. The location and appearance of all fences shall be subject to the approval of the Engineer.

1.08 CONTRACTOR PARKING

The Contractor shall not park his equipment, nor allow his personnel to park, in any area except those specifically designated by the Engineer and Owner.

1.09 TEMPORARY LIVING QUARTERS

Temporary living quarters shall not be allowed on the Site or on publicly owned properties. In addition, all local zoning codes for the area in question shall be strictly adhered to.

1.10 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES

The Contractor shall remove temporary toilets, storage sheds and other temporary construction facilities from the site as soon as, in Engineer's opinion, the progress of Work permits. Contractor shall recondition and restore those portions of the site occupied by the same to a condition equal to or better than it was prior to construction.

END OF SECTION

SECTION 01530 - PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall protect all existing utilities, piping and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, piping and improvements to a condition equal to or better than they were prior to such damage or temporary relocation.

B. The Contractor shall verify the exact locations and depths of all underground piping and utilities shown and not shown and shall make exploratory excavations of all piping and utilities that may interfere with the Work. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities, piping and other improvements that will be encountered during construction operations and verify that such utilities or other improvements are adequately protected from damage due to such operations.

C. Maintaining in Service: All pipelines, electrical, power, telephone communication cables, gas and water mains shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the Owner. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement the Contractor, after necessary scheduling and approval, shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the Owner of the facility. In all cases of such temporary removal or relocation, the Work shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement to a new condition meeting the specification requirements.

D. All repairs to a damaged utility or improvement are subject to inspection and approval by a Resident Project Representative before being concealed by backfill or other work.

1.02 RIGHTS-OF-WAY

A. The Contractor shall refrain from commencing work or entering upon the rights-of-way of any oil, gas, sewer or water pipeline; any telephone or electric transmission line; any fence; or any other structure, until notified by the Engineer that the Owner has secured authority to do so. After authority has been obtained, the Contractor shall give the governing utility proper advanced notice of its intention to begin work.

1.03 RESTORATION OF PAVEMENT AND SIDEWALKS

A. All paved areas and sidewalks not designated for replacement, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas unless otherwise noted. All sidewalks, curbs and gutters and pavements which are subject to partial removal shall be neatly saw-cut in straight lines. The sidewalk, curb and gutter and pavement shall be constructed in accordance with the Standard Details and Plans of the governing agency.

1.04 UNDERGROUND UTILITIES NOT SHOWN OR INDICATED

A. If the Contractor damages existing utilities, piping or improvements that are not illustrated or the location of which was not made known to the Contractor prior to excavation and the damage was not due to failure of the Contractor to exercise reasonable care the Contractor shall immediately notify the Engineer. If directed by the Engineer

repairs shall be made by the Contractor under the provisions for changes and extra work contained in Articles 10, 11 and 13 of the Standard General Conditions.

1.05 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications or telecommunication cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective utility purveyors or agencies or owners responsible for such facilities not less than three (3) working days prior to excavation so that a representative is afforded the opportunity to be present during the excavation work.

END OF SECTION

SECTION 01550 - SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 HIGHWAY AND STREET LIMITATIONS

A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits and other limitations affecting transportation and ingress and egress to the Site. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations or define any alternate routes to the Site due to roadway or bridge restrictions.

B. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, utility right-of-way or the Site during the performance of the Work hereunder. The Contractor shall conduct its operations so as not to interfere unnecessarily with the authorized work of utility companies, other agencies, or the Owner's plant personnel. No street or access shall be closed without first obtaining permission of the Engineer or proper governmental authority. Where excavation is being performed in primary streets or highways one (1) lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown by the Contract Documents. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks, access routes and the proper functioning of all gutters, sewer inlets and other drainage facilities.

C. Traffic Control: For the protection of traffic in public streets and construction workers at the Site, the Contractor shall provide, place and maintain all necessary barricades, traffic cones, warning signs, lights and other approved safety devices. All barricades, traffic cones, warning signs, lights and other approved safety devices shall be placed according to the agency requirements maintaining jurisdiction, as applicable. The Contractor shall take all necessary precautions for the protection of the Work and the safety of the Owner's personnel and the public. All barricades and obstructions shall be illuminated at night.

1.02 CONTRACTOR'S WORK AND STAGING AREA

A. The Owner will designate and arrange, for the Contractor's use, a portion(s) of the property on or adjacent to the Site for its exclusive use during the term of the Contract. The area is designated for an office, storage and shop area for construction operations relative to this Contract. Contractor shall be solely responsible for the security of its tools, supplies and equipment at the site. The staging area(s) for this project are illustrated on the new site plan of the Plans.

END OF SECTION

SECTION 01560 - PROJECT ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 EXPLOSIVES AND BLASTING

A. The use or storage of explosives on the Work or site will not be permitted.

B. Controls outlined in the Environmental Report developed for this project shall be implemented throughout the course of construction. A copy of the Environmental Report is included in the Special Conditions.

1.02 DUST ABATEMENT AND RUBBISH CONTROL

A. The Contractor shall provide under the Contract all necessary measures to prevent its operation from producing dust in amounts damaging to property or causing a nuisance to Owner's plant personnel and operations or to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for damage resulting from any dust originating from its operations. The dust abatement measures shall be continued throughout the length of the Contract.

B. During the progress of the Work the Contractor shall keep the Site and other areas used by it in a neat and clean condition and free from any accumulation of rubbish and waste materials. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Site, and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal and in conformance with all applicable Safety Laws and Health Standards for Construction. The Owner's dumpster shall not be used by the Contractor.

C. Contractor shall implement regulations set by CAL EPA and the Imperial County Air Pollution Control District for all work activities related to this Project.

1.03 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval for use by either the U.S. Environmental Protection Agency, the U.S. Department of Agriculture or the local jurisdictional agency. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

1.04 CULTURAL RESOURCES

A. The Contractor's attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical, architectural, archeological or cultural resources (hereinafter called "cultural resources). If potential cultural resources are discovered during subsurface excavations at the site of construction, the following procedures shall be instituted:

1. The Contractor shall immediately notify the Engineer.

2. The Engineer will issue a Field Order directing the Contractor to cease all construction operations at the location of such potential cultural resources find.

3. Such Field Order shall be effective until such time as a qualified archeologist can be called to assess the value of these potential cultural resources and make recommendations to the California State Historical Society Archeologist.

B. If the archeologist determines that the potential find is a bona fide cultural resource, at the direction of the California State Historical Society Archeologist, the Contractor shall suspend work at the location of the find under the provisions for changes contained in Articles 4, 8 and 18 of the Standard General Conditions and Supplementary Conditions 4.02, 4.06 and 4.06D.

1.05 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. The soil disturbance area resulted by the construction of the project will be less than 1 acre, therefore, the project is exempt from completing Storm Water Pollution Prevention Plan (SWPPP).

END OF SECTION

SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. To the greatest extent possible for each unit of work, the Contractor shall provide products, materials or equipment from a single source.

B. Where more than one choice is available as options for Contractor's selection of a product, material or equipment, the Contractor shall select an option which is compatible with other products, materials or equipment already selected.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. The Contractor shall transport, deliver, handle and store products in accordance with supplier's written recommendations and by methods and means which will prevent damage, deterioration and loss including theft. Delivery schedules shall be coordinated to minimize long-term storage of products at the Site and overcrowding of construction spaces. The Contractor shall provide installation coordination to ensure minimum storage times for products recognized to be flammable, hazardous or easily damaged.

B. Products shall be delivered in a dry, undamaged condition in the supplier's unopened packaging. The Engineer and Owner reserve the right to reject all damaged products, materials and equipment. Rejected products shall be immediately removed from the Site.

C. Products, materials and equipment shall be stored in accordance with the manufacturer's written instructions, with seals and labels intact and legible. Motors, electrical gear, mechanical equipment with open bearings or moving parts or any product sensitive to the environment shall be stored in weather-tight enclosures with necessary temperature and humidity ranges maintained within the manufacturer's instructions.

D. Fabricated structural components shall be stored on supports above ground and in a manner to prevent accumulation of water and warping. Products subject to deterioration from atmospheric conditions shall be covered in a manner that will provide adequate ventilation to avoid condensation.

E. Products, materials and equipment not stored in a manner that will insure the maintaining of a new condition will be rejected by the Engineer. Such rejected products, materials and equipment shall be immediately removed from the Site.

END OF SECTION 01600

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the requirements for final cleanup of the site.

1.02 FINAL SUBMITTALS

A. The Contractor, prior to requesting final payment shall obtain and submit the following items to the Engineer for transmittal to the Owner:

1. Written guarantees, where required.

2. Operating manuals, technical manuals and instructions. The Contractor's attention is directed to the condition that one percent (1%) of the contract price will be deducted from any monies due the Contractor as progress payments if at the seventy-five percent (75%) construction completion point the approved technical manuals have not been submitted in accordance with Section 01300 - Contractor Submittals. The aforementioned amount will be retained by the Owner as the agreed estimated value of the approved technical manuals. Any such retention of money for failure to submit the approved technical manuals on or before the seventy-five percent (75%) construction completion point shall be in addition to the retention of any payments due to the Contractor as specified in Article 14 of the Standard General Conditions and the Agreement.

3. Manufacturers representatives installation, testing and startup report.

4. Keying.

5. Maintenance stock items, spare parts and special tools.

6. Completed As-Builts.

7. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

8. Releases from all parties who are entitled to claims against the subject project, property or improvement pursuant to the provisions of law.

9. Extension of Performance Bond in accordance with Article 5.01A of the Standard General Conditions, if applicable.

1.05 MAINTENANCE AND GUARANTEE

A. The Contractor shall provide a bond to comply with the guarantee requirements contained in Article 5.01A of the Standard General Conditions.

B. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly the Owner reserves the right to do the Work and the Contractor and his surety

shall be liable to the Owner for the cost thereof. Replacement of native material or aggregate fill, backfill or resurfacing where it has settled below the required finish elevations shall be considered as part of such required repair work.

END OF SECTION

SECTION 01722 - SURVEYING

PART 1 - GENERAL

The Contractor is responsible to employ a California-licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying to oversee the land survey work for this project.

1.01 DESCRIPTION

A. Permanent Survey Marker:

1. The Contractor shall be responsible for the preservation of survey monuments and benchmarks except as noted herein. At least two (2) working days before the start of construction, the Contractor shall submit acceptable preconstruction survey tie notes to the Engineer's office. These tie notes shall be prepared by a California-licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying. These survey tie notes will be for all survey markers or benchmarks that may be lost or disturbed due to construction. Lost or disturbed monuments shall be replaced at the Contractor's expense by a California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying. Post-construction survey monument ties acceptable to the Engineer shall be submitted to the Engineer's office before the completion of the Work (see "Monuments", Section 8771, Land Surveyors Act, Division 3, Chapter 15 of the Business and Professions Code). The California Licensed Land Surveyor will re-establish the monuments and bench marks where survey services are provided by the California Licensed Land Surveyor, providing the Contractor protects the preconstruction reference points. In this case, where the monuments are to be removed or damaged by the Contractor, the Contractor shall notify the Engineer in writing seven (7) calendar days before starting the Work.

B. Lot Stakes:

1. The Contractor shall preserve property line and corner survey markers, except where their destruction is unavoidable. The lot stakes shall be replaced per Item A.1 above. Markers that otherwise are lost or disturbed by its operations shall be replaced at the Contractor's expense by the Land Surveyor/Engineer contracted by the Contractor.

C. Survey Services:

1. The California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying contracted by the Contractor will perform and be responsible for the survey work at the Site unless otherwise noted on the Plans or Specifications. The Contractor shall preserve construction survey stakes and marks for the duration of their usefulness. If any construction survey stakes are lost or disturbed and need to be replaced, such replacement shall be accomplished by the Engineer at the expense of the Contractor.

2. The California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying contracted by the Contractor shall establish horizontal and vertical control points for construction. The Contractor shall notify the Engineer in writing at least five (5) full working days before survey services are required in connection with the laying out of any portion of the work. The Contractor shall dig all holes necessary for line and grade stakes when requested by the Engineer.

3. The Contractor shall be responsible for their own layout based on the Land Surveyor/Engineer's survey stakes and cut sheets. The Contractor shall allow sufficient time for checking and issuance of cut sheets by the Engineer.

4. Unless otherwise specified, stakes will be set and stationed by the Land Surveyor/Engineer for curbs, ribbon gutters, headers, sewer pipelines, water pipelines, storm drains, structures, and rough grade. A corresponding cut or fill to finished grade (or flowline) will be indicated on the cut sheet.

D. Line and Grade:

1. The California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying contracted by the Contractor shall set alignment and grade stakes only for all on-site pipelines that are six-inches (6") in diameter or larger. The Contractor shall furnish all other lines and grades required for proper execution of the work.

2. After exterior walls have been located for the building, the Contractor shall be responsible for the location of all interior construction including interior piping within the building.

3. All work shall conform to the lines, elevations, and grades illustrated on the Plans.

4. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer in writing. In the absence of such written notification, the Contractor shall be responsible for any error in the grade of the finished work.

5. Grades for underground pipelines will be established by the offset hubs at the surface of the ground. The Contractor shall be responsible for transferring the grades to the bottom of the trench and pipeline.

E. Benchmarks:

1. The Contractor shall use the benchmarks illustrated on the Plans to conduct grading work at the project site. The Contractor shall be allowed to establish temporary benchmarks; however, the Contractor shall establish the temporary benchmarks from the benchmarks illustrated on the Plans. The Contractor shall provide the Engineer with fully prepared Level Notes substantiating the correct elevation of the temporary benchmark.

F. The Contractor shall provide grade checkers to verify subbase, subgrade and final grade elevations prior to those grades being checked, verified and approved by the Engineer. The Contractor shall provide grade checkers to place bluetop staking in parking lots, basins, roadways or other specified locations as required by Improvement Plans. Bluetop stakes are stakes set to grade. The Engineer will verify the grading work after the bluetop stakes have been placed by the grade checkers. The Contractor shall review Section 02200 - Earthwork; Section 02221 - Trenching, Backfilling and Compacting and Section 02510 - Asphalt Concrete and Paving, required for any required bluetop staking for this project.

G. The California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying contracted by the Contractor shall provide three (3) sets of cut sheets to the Contractor within 24 hours after completing a staking activity.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 – Earthwork

B. Section 02221 – Trenching, Backfilling and Compacting

C. Section 02510 – Asphalt Concrete and Paving

PART 2 - EXECUTION

2.01 SURVEY REQUIREMENTS

2.01.1. Lath and hubs shall be placed along the limits of construction on 50 foot on center and at corners at the commencement of construction.

2.01.2. Establish demolition lines with a painted line along the existing sidewalk and A.C. pavement areas.

2.01.3. Establish P.C.C. barrier curb, curb and gutter and ribbon gutter staking with 3 foot offset hubs placed 25 foot on center, beginning points, end points, B.C.'s, E.C.'s, radius points, ¼ delta and ½ delta locations. Cut and Fill vertical distances to top of curb or flowline shall be provided.

END OF SECTION

SECTION 01783 – AS-BUILT DRAWINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. As-Builts are full size drawings (Plans) and Record Project Manual which are marked up during construction to delineate the actual in-place constructed conditions. As-Builts shall be provided by the Contractor for this Project. Requirements for As-Builts, as specified elsewhere, shall supplement the requirements specified herein.

B. As-Builts shall include all changes in the Plans including those issued as Change Orders, Plan Clarifications, Addenda, Notice to Bidders, responses to Request for Information, Project Site Memos, and any additional details needed for the construction of the Project but not shown on the Plans. Any substructures encountered while excavating that are left in place shall be located by survey, to the satisfaction of the Engineer, shown, and identified on the As-Builts. All substructures including, but not limited to, concrete structures, electrical conduit and duct banks, drains and sanitary sewer pipelines, process piping, water lines, etc, whose installed location differs from that shown on the original Plans shall be precisely located by survey to the satisfaction of the Engineer and recorded on the As-Builts before backfilling.

C. As-Builts shall be marked with red ink or chemical fluid on one (1) set of full size prints to produce a record of the complete installation. Any additional drawings that may be required to indicate record conditions shall be prepared on 24" x 36" paper. All additions to the plans shall employ and use drafting standards which are consistent with the drafting standards used in the Contract.

D. The As-Builts, including those of all Subcontractors, shall be kept by the Contractor in the Contractor's Project Site Office, shall be updated during construction, and shall be available for the Engineer's inspection and copying at all times. The Engineer will review the As-Builts prior to submittal of all Monthly Payment Requests. If, in the opinion of the Engineer, the As-Builts are not current, approval of the Monthly Payment may be withheld until the drawings are made current.

E. Where the Plans are diagrammatic or lacking precise details, the Contractor shall produce dimensioned full size sheets as the As-Builts. For installations outside of the structures, the locations shall be given by coordinates and elevations. Where substructures are encased in concrete, the outside dimensions of the encasement shall also be given.

F. In the case of those Drawings which depict the detail requirements for equipment to be assembled and wired in the factory, the As-Builts shall be updated by indicating those portions which are superseded by final Shop Drawings and by including appropriate reference information describing the Shop Drawings by manufacturer, drawing and revision numbers.

G. At the Completion of the Work and after Final Inspection, the Contractor shall copy As-Built data, using red ink, onto a new set of Plans provided by the Owner. The Contractor shall certify to the completeness and accuracy of the "as installed" information indicated on the new set of Plans with its signature. The Contractor shall then deliver as a submittal to the Engineer, for review and approval, both the field developed As-Built Plans and the final signed As-Built Plans as a condition precedent to the Owner's release of any retained funds.

END OF SECTION

SECTION 02050 - DEMOLITION AND SALVAGE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide demolition and removal of existing structural materials, vegetation, exterior fencing, utility facilities, miscellaneous equipment, facilities and structures within the property boundary of HPUD Recreation Center in accordance with the requirements of the Contract Documents and as illustrated on the Improvement Plans.

Bidders shall examine the project site thoroughly during the bidding phase to verify the existing facilities to be demolished. Bidders shall immediately notify the Owner if there are any discrepancies between the site conditions and the demolition items to be removed and disposed of by the Contractor, as illustrated on the Demolition Plan. All remaining demolition items not struck through with a line on the Demolition Plan shall be completed by the Contractor.

The demolition operations of the existing structures include a complete demolition of the supporting foundation such as concrete footings, columns and beams, etc. on which the existing structures are mounted on.

B. The Contractor shall repair or replace, without cost to the Owner and to the satisfaction of the Engineer, existing facilities disturbed or damaged during demolition and removal operations.

C. Immediately upon removal of demolition items, the Contractor shall legally dispose of demolished items not to be salvaged. Demolished items not to be salvaged shall be removed from the Site within two (2) calendar days of the commencement of demolition activities. ***Unless noted in the Plans, the Owner reserves the right to salvage any of the existing material or equipment. The Contractor, upon being notified by the Engineer, shall salvage and relocate to an Owner-designated, on-site storage area any materials or equipment the Owner desires to keep. The cost of the removal and relocation of the items shall be included in the contract price.*** No demolished items shall be sold while on the Owner's property.

END OF SECTION

SECTION 02150 - SHEETING, SHORING AND BRACING

PART 1 - GENERAL

1.01 DESCRIPTION

This section provides requirements for sheeting, shoring, bracing, wales, posts, piling, anchorages and fastenings or other excavation supports, both temporary or permanent, for accomplishment and protection of Work.

1.02 QUALITY ASSURANCE

A. Design Requirements:

In accordance with Section 6500 of the Labor Code, the Contractor is required to obtain a permit, for the excavation of trench which is five feet (5') or more in depth and into which a person is required to descend, from the Division of Industrial Safety.

The Contractor shall furnish all labor, equipment and materials required to design, construct and remove all sheeting, shoring and bracing or other equivalent method of support for the walls of open excavations required for the construction of this project.

Excavation of any trench, pad area, foundation area, or structure five feet (5') or more in depth shall not commence until the Contractor has received approval from the Engineer of the Contractor's detailed plan for worker protection from the hazards of trench or soil wall collapse/failure.

Such plan shall be submitted at leave five (5) days before the Contractor intends to begin excavation and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. The plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

Prior to the beginning of excavations requiring shoring, the Contractor shall designate in writing to the Engineer, the person responsible to supervise the project safety measures and the person responsible to supervise the installation and removal of sheeting, shoring and bracing.

In addition to shoring the excavations in accordance with minimum requirements of the Industrial Safety Orders, it shall be the Contractor's responsibility to provide any and all additional shoring required to support the sides of the excavation against the effects of loads which may exceed those derived by using the criteria set forth in the Industrial Safety Orders. The Contractor shall be solely responsible for any damages which may result from his failure to provide adequate shoring to support the excavation under any or all of the conditions of grading which may exist, or which may arise during the construction of the project.

B. Material Standards:

Furnish lumber for shores, wales, and sheeting of grading required by the American Lumber Standards for the particular application.

1.03 SUBMITTALS

Contractor shall submit complete calculations of the sheeting system including sizing of sheeting wales, rakers, anchor system, struts, earth anchors, anchor piles, tie rods or any other components pertinent to the design prior to the start of any Work involving sheeting and bracing. All designs submitted shall be stamped and signed by an Engineer with a Civil or Structural designation with an active registration in the State of California.

1.04 JOB CONDITIONS

Buried debris may be found at some locations. Federal and local agency requirements for safety of job personnel and public will apply to work under the Section.

1.05 ALTERNATIVES

The use of application of alternative methods and materials, and the employment of proprietary systems under lease or franchise in lieu of that specified herein, may be allowed. Demonstration of suitability and compliance with these Specifications will be required. The application of alternative methods will be approved by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber:

1. Temporary Shores, Wales and Sheeting: Furnish structural grade planks, beams and posts as defined and specified for stress-grade lumber in the American Lumber Standards. Lumber may be rough, untreated, in random lengths, and shall be of standard dimensions.

2. Permanent Sheeting: When permanent sheeting is called for on the Drawings, provide and install planks, beams, posts and timers of unseasoned, rough, new southern yellow pine or Douglas Fir meeting the requirements of ASTM Standard D25, Class “C”. In lieu of the above, lumber dressed to standard dimensions, dried and treated in accordance with Standard T-3 of the American Wood Preservers’ Association may be utilized.

B. Fastenings:

Provide fastenings for permanent sheeting as recommended in the National Design Specification for stress-grade lumber and its fastening.

PART 3 - EXECUTION

3.01 INSTALLATION

Install sheeting and bracing for trench and structure excavation progressively as the removal of excavated material requires. Butt planks to exclude groundwater and fines, preventing the erosion of voids outside sheeting. In soft, wet ground drive sheeting to a lower level as excavation progresses to that sheeting is embedded in undisturbed earth. Bracing of sheet piling may be permitted to penetrate the structural concrete only as directed by the Owner. Refer to Section 03300 – Cast-in-Place Concrete. Install wales and struts at close intervals so as to prevent displacement of the surrounding earth and to maintain safe conditions in the Work area. Any damage proven to result from improper installations shall be the responsibility of the Contractor. Temporary sheeting for trench and structure excavation may be removed and reused. Withdraw

individual planks alternately as the backfill is raised, maintaining sufficient sheeting and bracing to protect the Work and workmen. Remove bracing completely. Where unstable conditions occur in the underlying strata from any cause, and withdrawal of sheeting will endanger the Work, a portion of the sheeting, including bracing, may be left in place with the approval of the Owner. Remove all wood within a zone extending four feet (4') below finished grade. Leaving such material in place shall not be cause for an increase in the contract price. The use of horizontal strutting below the barrel of a pipe or the use of a pipe as support will not be permitted. Sheet piling and timers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe. Trench sheeting below the top of the pipe shall be left in place.

END OF SECTION 02150

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Work of this Section includes all earthwork required for construction of the Work. Earthwork shall include, but not be limited to the loosening, removing, loading, transporting, depositing and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work specified in the Contract Documents which shall include, but not be limited to: the sawcutting and removal of A.C. pavement, P.C.C. concrete and underlying material to a subbase design grade indicated on the Plans, the installation of subbase material to a subbase grade beneath A.C. pavement and concrete infrastructure, the excavation of pipeline trenches, the installation of backfill material within pipeline trenches, excavations for above-grade and below-grade structures, backfill requirements for material to be placed beneath above-grade and below-grade structures, backfill requirements for the areas surrounding above-grade and below-grade structures, backfilling of manholes and catch basins, construction of earth embankments, backfilling of depressed areas, abandoned ponds or depressed areas resultant from demolition, the disposal of excess excavated materials, barrow of materials to make up deficiencies for fills; and all other incidental earthwork, all in accordance with the requirements of the Contract Documents.

Principal work items included in this Section are:

1. Site preparation, clearing and grubbing.
2. Preparation of fill areas.
3. Excavation and controlled fill construction.
4. Structural excavation and backfills.
5. Disposal of surplus and/or unsuitable materials.
6. Dust control and drainage control.
7. Grading
8. Clean-up.

1.02 REFERENCE STANDARDS

ASTM C 131	Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM D 75	Practice for Sampling Aggregates
ASTM D 422	Method for Particle-Size Analysis of Soils
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop
ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Method for Moisture-Density Relations of Soils Using Remmer and Drop
ASTM D 1682	Test method for Breaking Load and Elongation of Textile Fabrics
ASTM D 2419	Test method for Sand Equivalent Values of Soil and Fine Aggregate
ASTM D 2487	Classification of Soils for Engineering Purposes
ASTM D 2922	Test Method for Density of Soil in Places by Nuclear Methods (Shallow Depth)
ASTM D 3017	Test method for Water Content of Soil and Rock in Place by Nuclear Methods
ASTM D 3776	Test Method for Mass Per Unit Area (Weight) of Woven Fabric
ASTM D 4253	Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Plate
ASTM D 4254	Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D 4751	Test Method for Determining the Apparent Opening Size of a Geotextile
CAL-OSHA	Title 8 General Industry Safety Orders

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02150 - Sheeting, Shoring and Bracing

B. Section 02221 - Trenching, Backfilling and Compacting

C. Section 02640 - PVC Pipe

D. Section 02726 - Manhole and Precast Vault Construction

1.04 DEFINITIONS

A. Site: The property owned by the Heber Public Utility District. The site includes the Recreation Center.

B. Controlled Fill: Compacted suitable fill material in all areas of the site requiring filling to grade as shown on the Plans.

C. Structural Fill: Compacted suitable fill material which will support a structure or some part of a structure. This includes support material for P.C.C. structures and pads

D. Structural Backfill: Compacted suitable material placed between the wall of a structure and construction excavation slope up to finished grade.

E. Suitable Material: As specified herein shall be any material imported or excavated from the cut areas that is, in the opinion of the Engineer, suitable for use in constructing fills.

F. Waste Excavation: Also Surplus Material. Material from project excavations which is not suitable for use in backfill or compacted fills or is in excess of that required to be used for backfill or to construct fills.

G. Pipe Zone Backfill: Material suitable for placement below or surrounding the pipe to a given vertical distance above the pipe as required by the pipe section.

H. Pipe Trench Backfill: Material suitable for placement from the pipe zone to finish grade or to pavement subbase material.

1.05 SITE INVESTIGATION

A. Soil Investigation Report: A Geotechnical Report has been prepared for this project and is included in the Special Conditions Section of the Specifications.

B. Contractor's Responsibility: The Contractor shall carefully examine the site and make all inspections necessary in order to determine the full extent of the work required to make the completed Work conform to the Plans and Specifications. The Contractor shall satisfy himself/herself as to the nature and location of the Work, conditions, the conditions of the existing ground surface, and the character of equipment and facilities needed prior to and during prosecution of the Work. The Contractor shall satisfy himself/herself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered. The Contractor shall review water table conditions. Any inaccuracies or discrepancies between the actual field conditions and the Plans, or between the Plans and Specifications must be brought to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

C. Existing Elevations: All existing elevations illustrated on the Plans are approximate. The Contractor shall recognize and acknowledge the condition that the bid lump sum price shall include all earthwork activities irrespective of the possible localized difference in contour elevations and actual ground; and that there will be no additional compensation from the Owner for earthwork changes, engineering, or field staking in this regard.

1.06 SAFETY

The Contractor shall familiarize himself/herself with, and shall at all times conform to, the regulations of the "OSHA General Industry Occupational Safety and Health Standards", and "OSHA Safety and Health Regulations for Construction Safety Orders" and "Trench Construction Safety Orders" of the State of California, Department of Industrial Relations, Division of Occupational Health and Safety. A copy of these documents shall be kept on the job site.

1.07 ENVIRONMENTAL SAFEGUARDS AND REGULATIONS

The Contractor shall comply with regulations in force at all times to prevent pollution of air and water.

1.08 GEOTECHNICAL TESTING

The Contractor is responsible to employ a qualified Geotechnical Engineer to perform the required earthwork geotechnical testing specified within the contents of the Plans and Specifications. The cost for the Geotechnical Testing shall be borne by the Contractor. A copy of all tests shall be forwarded to the Engineer within four (4) days after the testing is complete. Geotechnical Earthwork Testing shall include in-situ native soil compaction testing, moisture-density soils testing, compaction testing, gradation testing, sand equivalent testing and similar testing. The Contractor shall bear the cost of retest and re-inspection of re-worked material due to faulty work.

1.09 STANDARDS FOR SOIL CLASSIFICATION, PROPERTIES AND TESTS

A. Earthwork and Embankment:

1. Classification - ASTM D 2487.

2. Physical Properties - ASTM D 854, D 2216.

3. Compaction - Modified Proctor ASTM D 1557-91.

B. Backfill for Trench:

1. Classification - ASTM D 2487.

2. Compaction - Modified Proctor ASTM D 1557-91.

3. Field Density Test - ASTM 1556-82; D 2937-83, D 2922-81 (as approved by Engineer).

C. Structural Fill and Backfill:

1. Classification - ASTM D 2487.

2. Attenberg Limits - PlastiOwner Index and Liquid Limit ASTM D 4318.

3. Compaction - Modified Proctor ASTM D 1557-91.

4. Physical Properties - ASTM D 854, D 2216.

5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

D. Controlled Fills:

1. Classification - ASTM D 2487.

2. Physical Properties - ASTM D 854, D 2216.

3. Compaction - Modified Proctor ASTM D 1557-91.

4. CBR - ASTM D 1883 (R-Value - ASTM 2844).

5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

E. Earth Embankments and Berms:

1. Classification - ASTM D 2487.

2. Physical Properties - ASTM D 854, D 2216.

3. Compaction - Modified Proctor ASTM D 1557-91

4. CBR - ASTM D 1883.

5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

F. Borrow:

1. Classification - ASTM D 2487.

2. Other properties - as determined by requirements at point of use.

G. Pipe Trenches:

1. Classification - ASTM D 2487.

2. Physical Properties - ASTM D 854, D 2216.

3. Compaction - Modified Proctor ASTM D 1557-91.

4. CBR - ASTM D 1883.

5. Field Density Test - ASTM D 1556-82, D 2937-83, D 2922-81 (as approved by Engineer).

1.10 COMPACTION

The maximum dry density, optimum moisture content and field density of each soil type used in the controlled compacted fill shall be determined as stated in Section 1.09 above.

1.11 INSPECTION

Observation and compaction tests shall be obtained by the Geotechnical Engineer employed by the Contractor during the filling and compacting operations.

1.12 GUARANTEE

Work required by this Section shall be subject to the guarantee requirements stated in the Conditions of the Contract and included in the Performance/Maintenance Bond.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Controlled Fill Material: Materials for controlled fill shall consist of any material imported or excavated from the *cut areas* that, in the opinion of the Engineer, is appropriate for use in constructing fills. The material shall contain no rocks or hard lumps greater than 12 inches in size and shall contain at least 40 percent of material smaller than ¾-inch in size. Materials greater than 6 inches in size shall be placed by the Contractor in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (sand equivalent greater than 30) shall be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversize material should be staggered so that successive strata of oversized material are not in the same vertical plane. No nesting or rocks shall be permitted. No material of a perishable, spongy, or otherwise of an improper nature shall be used in filling.

Material placed within 24 inches of rough grade shall be select material that contains no rocks or hard lumps greater than 6 inches in size and that swells less than 3 percent when compacted as hereinafter specified for compacted fill and when subjected to an axial pressure of 160 PSF, if not specified in the Geotechnical report.

Representative samples of material to be used for fill shall be tested in the laboratory by the Geotechnical Engineer in order to determine the maximum density, optimum moisture content, sand equivalent and classification of the soil. In addition, the Geotechnical Engineer shall determine the approximate bearing value of a recompacted saturated sample by direct shear tests or other tests applicable to the particular soil.

During grading operations, soil types other than those analyzed in the report of the soil investigation may be encountered by the Contractor. The Geotechnical Engineer shall be consulted to determine the suitability of these soils. The Contractor shall bear the expenses of the Geotechnical investigation.

B. Structural Fill Material: Materials shall consist of crushed rocks, Class 2 Base, granular sand, decomposed granite (crusher fines) or fine gravel either imported or manufactured from excavated onsite rocky material.

The crushed aggregate, granular sand, decomposed granite (crusher fines) or fine gravel shall be uniformly graded. The following gradations shall apply:

1. Granular Sand:

Clean granular sand free of clay, shale and deleterious material. Sand shall be compacted to 95 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise noted on the Plans. The material shall conform

to a sand equivalent of 30 or greater. The maximum amount of material passing the Number 200 sieve shall be 5 percent. The sand shall conform to the following gradation percentages:

SIEVE SIZE	GRANULAR SAND % PASSING
3/8”	100
No. 4	98-90
No. 8	90-75
No. 10	75-60
No. 16	60-50
No. 30	50-38
No. 40	38-29
No. 50	29-19
No. 100	19-7
No. 200	5-0

The Contractor shall supply a 5-gallon sample of sand material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The gradation, sand equivalent and maximum density of the sand material shall be determined. The test results shall be forwarded to the Engineer. The cost of testing shall be incurred by the Contractor. The gradation of the granular sand shall be determined and the test results forwarded to the Engineer prior to the delivery of the granular sand material to the Site. Prior to the placement of sand the native subbase grade shall be checked and approved by the Engineer.

Crusher fines shall be allowed to be utilized in lieu of sand if approved by the Engineer.

2. Crusher Fines:

Crusher fines shall consist of decomposed granite indigenous to the Imperial Valley. Crusher fines utilized for this project shall conform to the following gradation requirements:

SIEVE SIZE	PERCENT PASSING
5/8”	100
No. 4	80-100
No. 8	50-85
No. 30	30-50
No. 200	4-15

The sand equivalent shall be 20 or greater.

The Contractor shall supply a five-gallon sample of crusher fines material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The Gradation and Maximum Density of the crusher fines material shall be determined. The test results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

3. Fine Gravel:

Clean fine gravel free of clay, shale and deleterious material. Fine gravel shall be compacted with a plate compactor with one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor. The maximum amount of material passing the ¼" Sieve shall be 2 percent. The fine gravel shall conform to the following gradation percentages:

SIEVE SIZE	PERCENT PASSING
3/8"	100
1/4"	0-2

The Contractor shall supply a five-gallon sample of fine gravel material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The Gradation and Maximum Density of the fine gravel material shall be determined. The test results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

4. Class 2 Base:

The Class 2 Base material shall conform to Caltrans Section 26, Latest Edition, for 25mm maximum base material. The gradation requirements are as follows:

SIEVE SIZE	CLASS 2 BASE % PASSING
1"	100
¾"	87-100
No. 4	30-65
No. 30	5-35
No. 200	0-12

The sand equivalent shall be 25 or greater. An angular aggregate is to be used. Class 2 Base material shall be compacted to 95 percent of maximum density according to ASTM D 1557, unless otherwise noted on the Plans or Details. The tolerance for the Class 2 Base between design subgrade elevation and actual subgrade elevation as constructed in the field shall be plus or minus 0.02 feet as referenced from the design subgrade. Prior to the placement of Class 2 Base, the native subbase grade shall be checked and approved by the Engineer. The native subbase grade shall be within plus or minus 0.05 feet of native subbase design grade prior to the placement of Class 2 Base.

The Contractor shall supply a 5-gallon sample of the Class 2 Base to the material testing laboratory within four (4) days of the Notice to Proceed. The material shall be delivered to the testing laboratory to determine the maximum density, gradation, R-value, sand equivalent and durability index of the Class 2 Base. A copy of the test results shall be forwarded to the Engineer by the Geotechnical Consultant for review. The gradation of the Class 2 Base shall be determined and the test results forwarded to the Engineer for approval prior to the delivery of the Class 2 Base material to the Site. *Class 2 Base utilizing recycled materials shall not be allowed.*

C. Structural Backfill Material: Structural Backfill Material shall consist of the same material listed with the Structural Fill Material item above.

D. Special Crushed Rock Bedding and Structure Foundation: When groundwater is encountered in the excavation and/or where indicated on the Plans, the material in the bottom of the trench or excavation shall be removed to a depth directed by the Geotechnical Engineer and replaced with 3/4-inch maximum crushed rock bedding or 1" round rock bedding. The rock beddings shall be installed and compacted per these Specifications. The 3/4-inch maximum crushed rock and 1" round rock materials shall be approved by the Geotechnical Engineer before use.

The bottom and sidewalls of the trench shall be covered with a geotextile. The geotextile fabric shall extend to the top of the pipe zone material on both sides of the trench excavation, and cover the top of the crushed rock and or 1-inch round rock.

1. 3/4-Inch Maximum Crushed Rock

Crushed rock shall be the product of crushing rock or gravel. Fifty percent (50%) of the particles by weight retained on a 3/8-inch sieve shall have their entire surface area composed of faces resulting from fracture due to mechanical crushing. Not over 5% shall be particles that show no faces resulting from crushing. Less than 10% of the particles that pass the 3/8-inch sieve and are retained on the No. 4 sieve shall be waterworn particles. Gravel shall not be added to the crushed rock. Crushed rock (3/4") shall have the following gradation:

SIEVE SIZES	3/4-INCH MAX. CRUSHED ROCK % PASSING
1"	100
3/4"	90-100
1/2"	30-60
3/8"	0-20
No. 4	0-5
No. 8	-

The ¾-inch maximum crushed rock shall be compacted with a plate compactor in one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The Contractor shall supply a five-gallon sample of the ¾-inch maximum crushed rock material to the material testing laboratory within four (4) days of the Notice to Proceed. The Gradation and Sand Equivalent of the crushed rock shall be determined. The tests results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

2. 1" Round Rock

The 1-inch round rock material shall conform to the following gradation requirements:

SIEVE SIZES	1-INCH ROUND ROCK % PASSING
1-1/2"	100
1"	96
3/4"	79
1/2"	25

3/8” 1

The 1-inch round rock shall be compacted with a plate compactor in one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The Contractor shall supply a five-gallon sample of the 1- inch round rock material to the material testing laboratory within four (4) days of the Notice to Proceed. The Gradation of the round rock shall be determined. The tests results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

PART 3 - EXECUTION

3.01 GENERAL

The Work performed under this Specification shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated on the Plans, specified herein, and/or directed by the Owner. Slopes, graded surfaces, and drainage features shall present a neat uniform appearance upon completion of the Work.

It shall be the Contractor’s responsibility (1) to maintain adequate safety measures and working conditions; and (2) to take all measures necessary during the performance of the Work to protect the entire project area and adjacent properties which would be affected by this Work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Owner. It shall be the Contractor’s responsibility to maintain completed areas until the entire project area is in satisfactory compliance with the job specification.

Utility lines and structures indicated on the Plans which are to remain in service shall be protected by the Contractor from any damage as a result of his/her operation. Where utility lines or structures not shown on the Plans are encountered, the Contractor shall report them to the Owner before proceeding with the Work. The Contractor shall bear the cost of repair or replacement of any utility lines or structures which are broken or damaged by his/her operations.

3.02 REMOVALS, CLEARING AND GRUBBING

A. Clearing: Clearing consists of the complete removal of objectionable materials and obstructions above and below the ground surface including tree stumps, brush, grass, vegetative matter and other objectionable materials within the project limits. All brush and organic material shall be removed before placing any earth fills. It shall be the Contractor’s responsibility to save and protect all trees that lie outside the construction area.

B. Grubbing: Grubbing consists of the complete removal of stumps, including tap roots or lateral roots 1-1/2 inches or more in diameter, and the removal of brush, grass or weeds to depths below the natural ground as specified herein. Stumps shall be grubbed to a depth of 3 feet and grass or weeds shall be grubbed to a depth of 6 inches below the natural ground surface, or to the depths as determined in the field by the Engineer at the time of construction.

C. Protection: Existing items not designated to be demolished or removed shall be protected from damage. Any such item damaged by the Contractor shall be restored or replaced immediately at the Contractor’s expense.

D. Debris and Waste Material: All debris and waste material resulting from demolition, clearing and grubbing shall be removed from the site and disposed of by the Contractor.

3.03 DUST CONTROL

The Contractor shall take all steps possible to prevent and reduce dust arising from the construction activity. Section 01560 Project Environmental Controls elaborates on dust control requirements.

3.04 CARE OF DRAINAGE WATER

Contractor shall take care of drainage water from the construction operations, and of stormwater and/or wastewater reaching the construction area from any source, so that damage is not incurred to the excavation, pipe or structures. The Contractor shall be responsible for any damages to persons or property on or off the Site due to such drainage water or to the interruption or diversion of such stormwater or wastewater on account of his/her operation.

Such grading shall be done as may be necessary to prevent surface water from flowing into excavations, and any water accumulating therein shall be removed by pumping or by other reviewed methods.

Protection of the site during construction shall be the responsibility of the Contractor. Completion of a portion of the project shall not preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete.

3.05 EXCAVATION

A. General: The Contractor shall perform all excavation necessary or required as illustrated on the Plans. The excavation shall include the removal and disposal of all earth materials of whatever nature encountered, which shall include both rock excavation and common excavation when both are present, and shall include the furnishing, placing and maintaining of shoring and bracing necessary to safely support the sides of the excavations. See Technical Specifications Section 02150 Sheeting, Shoring and Bracing.

B. Excavation for Structures: Structure excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. The removal of such materials shall conform to the lines and grades shown on the Plans and/or herein specified. Temporary structure excavations shall at all times conform to the Requirements of the State of California, Division of Occupational Health and Safety, and pertinent requirements contained in referenced Geotechnical Investigation Report and Specification Section 02150 - Sheeting, Shoring and Bracing.

Continuous wall and isolated footings shall be underlain by a minimum compacted controlled fill thickness to a minimum 1.5 times the footing width or greater if indicated in the referenced Geotechnical Investigation Report or as required by the Plans. This zone of over-excavation, scarification and recompaction shall extend a minimum of five feet (5') beyond the footing lines unless otherwise illustrated on the Plans. Exposed native surface shall be scarified, and brought to optimum moisture content and compacted to a minimum of 95 percent relative compaction if required by the Geotechnical Investigation Report or the Plans.

All surfaces to receive concrete slabs-on-grade shall be underlain by a minimum compacted controlled fill thickness of 18 inches or greater if indicated in the referenced Geotechnical Investigation Report or as required by the Plans. This shall be accomplished by combination of over-excavation and recompaction to 95% of relative compaction or as required by the Geotechnical Investigation Report or as required by the Plans.

Contingent upon locations, all surfaces to receive compacted fill shall be scarified, brought to near optimum moisture content and compacted to required percentage of relative compaction as specified herein unless otherwise indicated on the Plans.

Rough grade excavations for structures and footings will be inspected by the Geotechnical Engineer to verify that the excavations extend into satisfactory soils and are free of loose and disturbed materials.

Foundation for tanks, pump vaults or subsurface chambers shall have structural fill material extending 12 inches, minimum, below the structural base slab to native material, which has been scarified and compacted to 95% relative compaction unless otherwise indicated on the Plans.

3.06 CONTROLLED FILL

A. General: Controlled fill shall consist of native material, granular sand, Class 2 Base, crusher fines or other material as indicated on the Plans. The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of controlled fill. The design subbase grade shall be field verified and approved by the Engineer prior to the placement of the controlled fill material. The Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Engineer's inspection of the subbase grade, the Contractor shall establish bluetop stakes on a 20-foot by 20-foot grid across the area controlled fill is to be placed.

If the controlled fill consists of native material it shall be placed in maximum 1-foot lifts and compacted to 90 percent of maximum density at optimum water content per ASTM D 1557. Additional native soil lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Engineer.

Granular sand, Class 2 Base and crusher fine controlled fill material shall be placed in maximum 8-inch lifts and compacted to 95 percent of maximum density at optimum water content per ASTM D 1557. Additional granular sand, Class 2 Base or crusher fine lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Engineer.

B. Preparing Areas To Be Filled: All vegetation and objectionable material shall be removed by the Contractor from the surface upon which the fill is to be placed and any loose and porous soils shall be removed or compacted to a depth specified by the Geotechnical Engineer. The surface shall then be plowed or scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal:vertical), horizontal keys and vertical benches shall be excavated into the adjacent slope area. Keying and benching shall be sufficient to provide at least 6-foot wide benches and a minimum of 4 feet vertical bench height within the firm natural

ground, firm bedrock or engineered compacted fill. No compacted fill shall be placed in an area subsequent to keying and benching until the area has been reviewed by the Geotechnical Engineer. Material generated by the benching operation shall be moved sufficiently away from the bench area to allow for the review of the horizontal bench prior to placement of fill.

After the foundation for the fill has been cleared, plowed or scarified, it shall be disced or bladed by the Contractor until it is uniform and free from large clods, brought to the proper moisture content and compacted as specified.

C. Placing, Spreading and Compacting Fill Material: The fill material shall be placed by the Contractor in thin layers that when compacted shall not exceed 8 inches for granular sand, Class 2 Base and crusher fines and 12 inches deep for native material. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

When the moisture content of the fill material is below that required by the Geotechnical Engineer, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of five feet (5'). If the desired compaction is not achieved, the existing slope shall be overexcavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

3.07. STRUCTURE FILL AND STRUCTURE BACKFILL MATERIAL

A. Placement of Structure Backfill: Before beginning backfilling, all foreign material, including water, shall be removed from the space to be backfilled and the area to be backfilled shall be inspected and approved by the Geotechnical Engineer. Sloping sides of the excavated space shall be stepped to prevent wedging action of the backfill against the structure. No backfill shall be placed around or upon any structure until it is proven

that the concrete has attained satisfactory strength in accordance with the Division 3 of Technical Specifications and that the structure as a whole is adequate to receive backfill. The compressive strength shall be determined by tests on representative cylinders cured under conditions similar to those prevailing at the site.

B. General: Structure fill and structure backfill shall consist of granular sand, Class 2 Base, crusher fines or other material as indicated on the Plans. The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of structure fill and structure backfill. The design subbase grade shall be field verified and approved by the Engineer prior to the placement of the structure fill or structure backfill material. The Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Engineer's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 20-foot by 20-foot grid across the area which structure backfill is to be placed.

Granular sand, Class 2 Base and crusher fine structure fill and structure backfill material shall be placed in maximum 8-inch lifts and compacted to 95 percent of maximum density at optimum water content per ASTM D 1557. Additional granular sand, Class 2 Base or crusher fine lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Engineer.

C. Placing, Spreading and Compacting Fill Material: The structural fill and structural backfill material shall be placed by the Contractor in thin layers that when compacted shall not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

When the moisture content of the fill material is below that required by the Geotechnical Engineer, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of five feet (5'). If the desired compaction is not achieved, the existing slope shall be overexcavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess

sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

3.08 SUITABLE MATERIAL AND WASTE EXCAVATION

A. General: Suitable material or waste excavation consists of native material. The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of suitable material or waste excavation material. The design subbase grade shall be field verified and approved by the Engineer prior to the placement of the suitable material or waste excavation material. The Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Engineer's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 20-foot by 20-foot grid across the area suitable material or waste excavation material is to be placed.

The suitable material or waste excavation material shall be placed in maximum 1-foot lifts and compacted to 90 percent of maximum density at optimum water content per ASTM D 1557. Additional suitable material or waste excavation material lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Engineer.

B. Placing, Spreading and Compacting Suitable Material and Waste Excavation Material: The suitable material and waste excavation material shall be placed by the Contractor in 1-foot lifts. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

When the moisture content of the fill material is below that required by the Geotechnical Engineer, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of five feet (5'). If the desired compaction is not achieved, the existing slope shall be overexcavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess

sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

3.09 ESTABLISHMENT OF SUBBASE GRADE, SUBGRADE OR FINISH GRADE

Finish Grade is defined as the finish surface grade. For instance, the top of an A.C. or P.C.C. paved surface is referred to as finish grade.

Subgrade is defined as the grade of the material beneath the finish surface. For instance, the top of Class 2 Base grade beneath an A.C. or P.C.C. paved surface is referred to as subgrade.

Subbase is defined as the grade of the material beneath the base material. For instance, the top of native material beneath the Class 2 Base subgrade material of an A.C. or P.C.C. paved roadway is the subbase grade.

Finish grade surfaces are to be graded to within plus or minus 0.02 feet from design grade as illustrated on the Grading Plans. The Contractor shall place bluetop stakes on a 20-foot x 20-foot grid across the top of the finish grade surface during final grading. A bluetop stake is defined as a stake placed at the finish grade elevation within the tolerance of plus or minus 0.02 feet of finish grade. The Engineer shall obtain elevations across finish grade surfaces at locations determined by the Engineer prior to accepting and approving the finish grade surfaces. The Contractor shall rework areas not conforming to the finish surface grade tolerance as required. Work items to occur after the establishment of finish grade shall not occur until the Engineer has approved the finish grade.

Subgrade surfaces are to be graded to within plus or minus 0.02 feet from design grade as illustrated on the Grading Plans. Bluetop stakes shall be placed on a 20-foot x 20-foot grid pattern across rectangular or square facilities such as parking lots and access roads. The Engineer shall obtain elevations across the subgrade surfaces at locations determined by the Engineer prior to accepting and approving the subgrade surfaces. The Contractor shall rework areas not conforming to the subgrade tolerance as required. Work items to occur after the establishment of subgrade shall not occur until the Engineer has approved the finish grade.

Subbase surfaces are to be graded to within plus or minus 0.05 feet of subbase design grade as illustrated on the Grading Plans. Bluetop stakes shall be placed on a 20-foot x 20-foot grid pattern across rectangular or square facilities such as parking lots, access roads, sludge beds, etc. The Engineer shall obtain elevations across the subbase surfaces at locations determined by the Engineer prior to accepting and approving the subbase surfaces. The Contractor shall rework areas not conforming to the subbase design grade tolerance as required. Work items to occur after the establishment of subbase grade shall not occur until the Engineer has approved the subbase grade.

3.10 COMPACTION TEST SCHEDULE

The following **compaction test(s)** shall apply to this project:

NO.	ITEM	FREQUENCY
1	A compaction test for granular sand or Class 2 Base under each of the two (2) sidewalk/curb and gutter sections along Heber Avenue	2 tests

2	Compaction tests for the Class 2 Base beneath the P.C.C. barrier curb along the A.C. paved parking lot.	4 tests
3	Compaction tests for the Class 2 Base material beneath the sidewalk and building entrance stoops along the parking lot.	6 tests
4	Compaction tests for native earth material beneath the exterior P.C.C. slab along the side of the Building.	2 tests
5	Compaction Tests for the Class 2 Base material beneath the exterior P.C.C. slab along the side of the Recreation Center Building.	2 tests
6	Building Pad granular sand compaction tests. There is 2.5 feet of granular soil to be placed beneath the building slab in 8-inch lifts. Obtain compaction tests for each 8-inch lift.	16 tests

3.11. CLEAN-UP

Upon completion of Work in this Section, all rubbish and debris shall be removed from the site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a clean, neat and acceptable condition.

END OF SECTION 02200

SECTION 02221 - TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

Requirements specified in the Technical and Special Conditions form a part of this Section. The Work of this Section includes all labor, machinery, construction equipment and appliances to perform in a professional manner all trench excavation and backfill work illustrated on the Plans and herein specified.

A. Principal items included:

1. Trench excavation, backfill and compaction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 – Earthwork

B. Section 02150 – Sheeting, Shoring and Bracing

C. Piping & Conduit Work specified in other Sections

1.03 SAFETY

The Contractor shall be familiarized with, and shall at all times conform to all applicable regulations of "Excavations, Trenching, and Shoring" of OSHA Safety and Health Regulations for Construction, "General Construction Safety Orders" and "Trench Construction Safety Orders" of the State of California, Department of Industrial Relations, Division of Occupational Health and Safety.

1.04 INSPECTION AND CONTROL

The Contractor shall provide inspection and testing by a Geotechnical Engineer approved by the Engineer engaged and paid for by the Contractor. In this regard, a Geotechnical Engineer may be engaged by the Owner, who shall act as the direct representative of the Owner in geotechnical work, to perform inspection of the removal and replacement of unsuitable materials, all excavations, and the placement and compaction of all fills and backfills within the limits of earthwork on this Project. Costs for all such inspections and tests will be paid by the Contractor, and Contractor shall bear the cost of retest and re-inspection of reworked fills and backfills due to compaction test failure.

1.05 REQUIREMENTS

A. General:

1. The Work performed under this Specification shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated on the Plans, specified herein, and/or directed by the Engineer in writing. Slopes, graded surfaces, and drainage features shall present a neat, uniform appearance upon completion of the Work.

2. It shall be the Contractor's responsibility (1) to maintain adequate safety measures and working conditions; and (2) to take all measures necessary during the performance of the Work to protect the entire project area and adjacent

properties which would be affected by this Work from storm damage, flood hazard, caving of trenches, cavings of excavations, and embankments, and sloughing of material, until final acceptance by the Owner. It shall be the Contractor's responsibility to maintain completed areas in good condition until the entire project area is in satisfactory compliance with the Project Specifications.

3. Contractor shall be responsible for the excavation and disposition of unsuitable or surplus material by approved means of conveyance away from the working area.

B. Protection of Existing Utilities:

1. Utilities: Unless otherwise illustrated on the Plans or stated in the Specifications, all utilities, both underground or overhead, shall be maintained in continuous service throughout the entire contract period. The Contractor shall be responsible and liable for any damages to or interruption of service caused by the construction.

If the Contractor desires to simplify his operation by temporarily or permanently relocating or shutting down any utility or appurtenance, he shall make the necessary arrangements, agreements and approvals with the utility purveyor, Owner and Engineer and shall be completely responsible for all costs concerned with the relocation or shutdown and reconstruction. All property shall be reconstructed in its original or new location as soon as possible and to a condition at least as good as its previous condition. This cycle of relocation or shutdown and reconstruction shall be subject to inspection and approval by the Engineer, Owner and the utility purveyor.

The Contractor shall be entirely responsible for safeguarding and maintaining all conflicting utilities that are illustrated on the Plans. This includes overhead wires and cables and their supporting poles whether they are inside or outside of the open trench. If, in the course of work, a conflicting utility line that was not illustrated on the Plans is discovered, it shall be brought to the immediate attention of the Engineer for a determination regarding alternatives to the conflict.

2. Building, Foundations and Structures: Where trenches are located adjacent to buildings, foundations and structures, the Contractor shall take all necessary precaution against damage to them. The Contractor shall be liable for any damage caused by the construction except where authorized in the Special Conditions or in writing by the Engineer. Water settling of backfill material in trenches adjacent to structures will not be permitted.

3. Electronic, Telephonic, Telegraphic, Electrical, Oil and Gas Lines: These underground facilities shall be adequately supported by the Contractor. Support for plastic pipe shall be continuous along the bottom of the pipe. Support for metal pipe and electrical conduit may be continuous or nylon webbing may be used for suspension at no greater than ten foot (10') intervals. The Contractor shall avoid damaging the plastic pipe, pipe ways or conduits during trench backfilling and during foundation and bedding placement.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Granular Sand Material: Granular sand material shall consist of imported granular sand complying with Section 02200, of the specifications.

B. Crusher Fines: Crusher fines material shall consist of imported decomposed granite complying with Section 02200, of the specifications.

C. Class 2 Base Material: Class 2 Base material shall consist of imported virgin (not recycled) Class 2 Base complying with Section 02200, of the Specifications.

D. Crushed Rock Bedding: Crushed rock bedding shall consist of imported rock complying with Section 02200, of the Specifications.

E. 1-inch Round Rock: 1-inch Round Rock material shall consist of import rock material complying with Section 02200, of the Specifications.

F. Concrete: 5000 PSI compressive strength, minimum, as specified in Division 3, Concrete, of the Specifications.

G. Pipelines: Use materials shown on the Plans and as specified in other pertinent Sections of the Specifications.

PART 3 - EXECUTION

3.01 TRENCH EXCAVATION

A. Excavation for Trenches: Shall include the removal of all material of any nature for the installation of the pipe or facility and shall include the construction of trench shoring and stabilization measures, timbering and all necessary installations for dewatering.

B. Minimum Width of Trench: The minimum width of pipe trenches, measured at the crown of the pipe, shall not be less than 12 inches greater than the exterior diameter of the pipe, exclusive of bells and the minimum base width of such trench shall be not less than 12 inches greater than the exterior diameter of the pipe, exclusive of special structures or connections, and such minimum width shall be exclusive of all trench supports.

C. Maximum Width of Trench: The maximum allowable width of trench for all pipelines measured at the top of the pipe shall be the outside diameter of the pipe (exclusive of bells or collars) plus 16 inches, and such maximum shall be inclusive of all timbers. A trench wider than the outside diameter plus 16 inches may be used without special bedding if the Contractor, at his expense, furnishes pipe of the required strength to carry the additional trench load. Such modifications shall be submitted for the Engineer's review. Whenever such maximum allowable width of trench is exceeded for any reason, except as provided for on the Plans or in the Specifications, or by the written direction of the Engineer, the Engineer may, at its discretion, require that the Contractor, at his own expense for all labor and materials, cradle the pipe in 5,000 PSI compressive strength concrete, or other approved pipe bedding.

D. Maximum Length of Open Trench: Except by special permission by the Engineer only that amount of open trench shall be permitted, which shall allow for that amount of pipeline construction, including excavation, construction of pipeline, and backfill in any one location, which can be completed in one day; however, maximum length of open trench shall never exceed 600 feet. This length includes open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily resurfaced.

E. Trench Side Slopes:

1. Temporary trench excavations shall at all times conform to the safety requirements hereinbefore specified in Section entitled "Safety".

2. Loose cobbles or boulders shall be removed from the sides of the trenches before allowing workmen into the excavation, or the trench slopes must be protected with screening or other methods. Trench side slopes shall be kept moist during construction to prevent local sloughing and raveling. Surcharge loads due to construction equipment shall not be permitted within 10 feet of the top of any excavated slope.

3. If the Contractor elects to shore or otherwise stabilize the trench sides, he shall file with the Engineer copies of drawings for same prepared, signed and stamped by a Civil Engineer duly registered in the State of California before commencing excavation.

F. Excess Trench Excavation: If any trench, through the neglect of the Contractor, is excavated below the bottom grade required, it shall be refilled to the bottom grade, at the Contractor's expense for all labor and material, with granular sand material compacted to a firm stable foundation.

3.02 BRACING TRENCHES

The sides of the trenches shall be supported with plank sheeting and bracing in such a manner as to prevent caving of the sides of the trench. Space left by withdrawal of sheeting or shoring shall be filled completely with dry granular material blown or rammed in place. Trench shoring shall be completed per the recommendations of the Geotechnical Report and OSHA Standards.

3.03 PIPING BEDDING

The Contractor shall excavate to four inches (4") below the bells or couplings for the full width of the trench and shall place four inches (4") of granular material upon which the pipe is to be laid, unless indicated otherwise on the Plans. Construct pipe bedding as indicated on the Plans.

At pipe subgrade, if foundation soil in trench is soft, wet, spongy, unstable or does not afford solid foundation for pipe, the Contractor shall excavate as directed by the Engineer and provide stable base by excavating any unsuitable material 18" minimum below the subgrade base or as the Engineer determines is necessary for placement of pipe bedding. A filter fabric shall be placed in the trench bottom and along the trench sidewalls in the pipe zone to the top of the pipe zone material. A crushed rock material shall be placed at the bottom of the trench and sidewalls of the pipe to a point 1 foot above the pipe. The crushed rock material shall be hand tamped in 16-inch lifts along the sidewalls. The crushed rock shall be compacted with a plate compactor in minimum 6 inch lifts beneath the pipe and over the top of the pipe.

Where rock is encountered in the trench, the Contractor shall excavate to a minimum 18 inch depth below subgrade or as the Engineer determines is necessary, and shall construct a base by placing crushed rock bedding upon which a subgrade can be prepared.

Before any pipe is lowered in place, the trench bottom shall be prepared so that each pipe shall be supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of one-half (1/2) of the pipe OD, and a width equal to the trench width. All adjustments in line and grade shall be made by scraping away or filling and tamping in under the barrel of the pipe. Wedging or blocking is not permitted.

The pipe bedding shall be compacted to a minimum of 90 or 95 percent relative compaction as hereinafter specified or as required by the Plans.

3.04 BACKFILLING PIPE TRENCHES

A. Backfilling Pipe Zone: Backfill material for the pipe zone shall consist of imported granular material or two sack cement/sand slurry as required by the Plans. Place material in the trench simultaneously on each side of the pipe for the full width of the trench and the depth of the pipe zone in layers 6 inches in depth. Each layer shall be thoroughly compacted by tamping. In all cases, backfilling of the pipe zone must be accomplished by hand. Particular attention shall be given to underside of the pipe and fittings to provide a firm support along the full length of the pipe. The pipe zone shall be considered to extend 12 inches above the top of the pipe unless otherwise illustrated on the Plans, and shall be compacted in the trench to a relative compaction of not less than 90 or 95 percent of maximum density per ASTM D 1557 as illustrated on the Plans. Care shall be taken not to damage pipe and fittings or special coatings on the pipe and fittings.

1. Use of material other than those specified shall be reviewed by the Engineer prior to use. The Contractor shall bear all cost of removal of rejected material, its hauling to an authorized disposal site, and cost of providing required material to complete the bedding and backfilling.

B. Backfilling Pipe Trench: After the pipe has been laid in the trench and has been inspected and approved, and backfilling in the pipe zone is complete and compacted, the remainder of the trench may be backfilled. The backfill material shall be granular sand or Class 2 Base as specified in Paragraph 2.01 and illustrated on the Plans. Care shall be taken to ensure that no voids remain under, around or near the pipe.

1. The Contractor shall incur the expense to remove and dispose of the excess trench excavation material displaced by the trench import material and include the costs in the bid.

C. Compaction: The maximum dry density and optimum moisture content of each soil type used in the controlled compacted fill shall be determined by ASTM D 1557-91. Field density tests shall be determined in accordance with ASTM D 1556-82, ASTM D 2937-83 and ASTM D 2922-81.

D. Placement and Compaction of Trench Backfill: The placement and compaction of all trench backfill shall be as follows:

1. Mechanically Compacted Backfill: With approval of the Engineer, backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers to 90 or 95 percent relative compaction as illustrated by the Plans. Impact-type pavement breakers (stompers or hydro-hammers) shall not be permitted over any pipe. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements or improvements installed under the Contract. The Contractor shall make his own determination in this regard. Backfill shall be placed in horizontal layers not exceeding eight inches (8”). Each layer shall be evenly spread, the moisture content brought to near optimum condition and then tamped or rolled until the specific relative compaction has been attained. Additional backfill lifts shall not be placed until previous lifts have been satisfactorily compacted and tested and approved by the Engineer.

3.05 CENTRAL PIPELINE INSTALLATION REQUIREMENTS

A. Depth of Pipe: Unless otherwise illustrated on the Plans, all pipelines shall have coverage of at least 36 inches between the top of the pipe and the finished surface. All gravity line invert elevations and locations illustrated on the Plans are intended to be exact and any change in alignment and grade shall be reviewed in accordance with the Contract Documents to the satisfaction of the geotechnical testing representative and Engineer. All force and gravity mains shall have 1 foot vertical clearance between themselves and all other utilities. At all water main, sewer and stormwater crossings, both gravity and force mains shall have 20 linear feet of concrete encasement centered at the crossing as required by the State of California Department of Health.

B. Changes in Line and Grade: In the event obstructions not shown on the Plans, are encountered during the progress of the Work, which will require alterations to the Plans, the Engineer shall issue the necessary revisions to the Plans and order the necessary deviation from the line or grade. The Contractor shall not make any deviation from the specified line and grade without prior review and approval by the Engineer. Should any deviations in line and grade be permitted by the Engineer in order to reduce the amount of rock excavation or for other similar convenience to the Contractor, any additional costs for thrust blocks, valves, air and vacuum valve assemblies, blow-off assemblies, extra pipe footage, concrete, sewer structures, or other additional costs shall be borne by the Contractor.

1. Contractor shall include in his Bid provisions to cover any deviation from the invert grade shown on the Plans to facilitate the extra depth required to avoid possible conflicts between existing gravity pipelines and other utilities with new water, stormwater or sewer forcemains.

C. Pipe Installation:

All pipe and fittings, and accessories furnished by the Contractor shall be new material free from rust or corrosion. All piping and fittings shall be cleaned on the inside when installed and the Contractor shall take all necessary precautions to insure that the lines are kept free of any foreign matter and dirt until the work is completed. All pipes shall be carefully placed and supported at the proper lines and grades as shown on the Plans. Piping runs shown on the Plans shall be followed as closely as possible, except for minor adjustments as approved by the Engineer to avoid other piping or structural features. Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe. Hunching of the pipe shall not be allowed. Pipe will be carefully inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection by the Engineer. Any corrective work shall be approved by the Engineer. Pipe shall be laid true to line and grade with uniform bearing under the full length of the barrel of the pipe. Suitable excavation shall be made to receive the bell or collar which shall not bear upon the subgrade or bedding. Any pipe which is not in true alignment or shows any undue settlement after laying shall be taken up and relaid at the Contractor's expense. Pipe shall be laid upgrade with the socket ends of the pipe upgrade unless otherwise authorized by the Engineer. Pipe sections shall be laid and joined in such a manner that the offset of the inside of the pipe at any joint will be held to a minimum at the invert. The maximum horizontal offset at the invert of the pipe shall be 1% of the inside diameter of the pipe or 0.02 feet, whichever is smaller. The vertical grade shall be ± 0.02 feet of the design invert. In joining socket pipe, the spigot of each pipe shall be so seated in the socket of the adjacent pipe as to give a uniform annular space all around the pipe in the socket.

The following pipe installation items shall be required:

1. No pipe shall be laid which is damaged, cracked, checked or spalled or has any other defect deemed by the Engineer to make it unacceptable, and all such sections shall be permanently removed from the Work.

2. At all times when the Work of installing pipe is not in progress, all openings into the ends of the pipelines shall be kept tightly closed with suitable plywood or sheet metal bulkheads to prevent the entrance of animals and foreign materials and to prevent water from entering the pipe.

3. Keep the pipe trench free from water at all times and take all necessary precautions to prevent the pipe from floating due to water entering the trench from any sources. Any damage is the Contractor's full responsibility. Restore and replace the pipe to its specified conditions and grade if it is displaced due to floating.

4. All pipelines adjoining concrete structures (including manholes) shall have a flexible joint, such as sleeve transition couplings, within 36 inches from the face of such concrete structures. Flexible joints shall be installed on all pipe 4" and larger whether or not a flexible joint is illustrated on the Plans. Where the flexible joint is illustrated on the Plans, install the joint at the location indicated.

3.06 COMPACTION OF PIPE BEDDING AND BACKFILL

Unless specified in the Plans or Earthwork Specification (Section 02200), the following compaction test for piping shall be required.

A. One (1) compaction test for the granular sand fill pipe bedding along each 100 lineal foot of water, sewer or stormwater pipe placed for each 1 foot lift of material installed.

B. One (1) compaction test shall be obtained for each 1 foot lift of Class 2 Base material along each 100 foot section of water, sewer or stormwater pipeline installed.

C. One (1) compaction test shall be required for each 1 foot of vertical sand fill material placed along each 100 feet of water, sewer or stormwater pipeline installed.

D. One (1) compaction test shall be obtained for each 1 foot lift of native material along each 100 foot section of water, sewer or stormwater pipeline installed.

E. One (1) compaction test shall be obtained for each 1 vertical foot of native material placed around stormwater or sanitary sewer manholes. A geotechnical testing representative shall be present at the time the sanitary sewer or stormwater pipeline and sanitary sewer or stormwater manholes are backfilled to monitor the placement of backfill material and complete compaction testing. Additional lifts shall not be installed until previous lifts have attained the specified compaction and is approved by the on-site geotechnical representative and Engineer.

3.07 CLEAN-UP

Immediately upon completion of Work for this Section, all rubbish and debris shall be removed from the Site. All pipe trench areas shall be finish graded with a "blade" or "motor patrol". All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition.

END OF SECTION

SECTION 02600 – PAVEMENT MARKINGS AND PAINTED TRAFFIC STRIPES

PART 1 - GENERAL

1.01 DESCRIPTION

This item shall consist of the painting of markings and stripes on the surface of the A.C. pavement in accordance with the locations and requirements illustrated on the Plans. All painting of markings and stripes shall conform to Caltrans Standard Plans and Specifications, latest edition, unless noted otherwise.

PART 2 - PRODUCTS

2.01 PAINT

Paint shall meet the requirements of the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, Section 214-4.2 and the Table 214-4.1(a).

2.02 RAPID DRY PAINT

The paint shall conform to the rapid dry paint specified in the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, Section 214.

2.03 REFLECTIVE MEDIA

A glass sphere reflective media shall be required per Section 214-3 of the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition.

PART 3 - EXECUTION

3.01 WEATHER LIMITATIONS

The painting shall be performed only when the surface is dry, when the atmospheric temperature is above 60 degrees F., and when the weather is not foggy or windy.

3.02 EQUIPMENT

All equipment for the work shall be approved by the Engineer and shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job. The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designated so as to apply markings of uniform cross sections and clear-cut edges without running or spattering.

3.03 PREPARATION OF SURFACE

Immediately before application of the paint, the pavement surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials.

3.04 LAYOUT OF MARKINGS

The proposed markings shall be laid out in advance of the paint application according to the dimensions required by the Plans and Specifications or by Caltrans Standards.

3.05 APPLICATION

Markings shall be applied at the locations and to the dimensions and spacing shown on the Plans. Paint shall not be applied until the layout and condition of the surface have been approved by the Engineer.

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at a rate specified in the Standard Specifications for Public Works Construction, "Greenbook", 2012 edition, Section 214.

The addition of thinner will not be permitted. The edges of the markings shall not vary from a straight line more than ¼ inch in 50 feet, and the dimensions shall be within a tolerance of plus or minus 2 percent.

The Contractor shall furnish certified test reports for the materials shipped to the project. The reports shall not be interpreted as a basis for final acceptance. The Contractor shall notify the Engineer upon arrival of shipment of the paint to the job site. All emptied containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the project site or destroyed until authorized by the Engineer.

A minimum of two (2) coating applications shall be applied for two (2) separate times. First two (2) coating applications shall be completed at least fifteen (15) days after the slurry seal coat application has been completed on the asphalt pavement surface. Second two (2) coating applications shall be completed at least fifteen (15) days after the initial two (2) coating applications have been completed.

3.06 PROTECTION

After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from disfiguration by spatter, splashes, spillage or drippings of paint.

END OF SECTION

SECTION 02640 - PVC PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish and install all Polyvinyl Chloride (PVC) plastic pipe, fittings, transitions, connections and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 - Earthwork

B. Section 02221 - Trenching, Backfilling and Compacting

C. Section 02666 – Pressure Pipeline Water Testing

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM D 1784 and ASTM D 1785	Specifications for Polyvinyl Chloride (PVC) Plastic Pressure Pipe
ASTM D 3034	Specifications for Polyvinyl Chloride (PVC) Plastic Gravity Sewer Pipe
AWWA C 900 and AWWA C 905	Specifications for Polyvinyl Chloride (PVC) Plastic Water Pressure Pipe
ASTM D 2321	Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
NSF / ASNI 61	Drinking Water System Components – Health Effects

1.04 CONTRACTOR SUBMITTALS

A. Contractor shall submit copies of the manufacturer's product specifications according to the requirements of Section 01300 - Contractor Submittals.

PART 2 - PRODUCTS

2.01 PVC (POLYVINYL CHLORIDE) PRESSURE PIPE, 4 INCHES AND SMALLER SOLVENT-WELDED

A. All PVC pressure pipe 4 inches and smaller shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact Class 12454-B, Schedule 80, to conform to ASTM D 1785, unless otherwise shown. Elbows and tees shall be of the same material and schedule as the pipe. Unless otherwise shown, joint design shall be for solvent-welded construction.

2.02 AWWA C 900 AND AWWA C 905 WATER PIPELINE WITH BELL AND SPIGOT JOINTS

This Specification designates general requirements for unplasticized polyvinyl chloride (PVC) plastic class water pipe with integral bell and spigot joints for the conveyance of water. Pipe shall meet the requirements of AWWA C 900 or AWWA C 905 "Polyvinyl Chloride (PVC) Water Distribution".

All pipe shall be suitable for use as pressure conduit, provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a factory installed, solid cross-section elastomeric ring which meets the requirements of ASTM F 477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C 900. Sizes and dimensions shall be as shown in this Specification. Joint design shall meet qualification requirements of ASTM F 3139. Each pipe shall be tested to four times the pressure class of the pipe for a maximum of 5 seconds. The integral bell shall be tested with the pipe. Standard laying lengths shall be 20 feet (±1") for all sizes.

The pipe stiffness using F/ΔY for PVC class water pipe is contained in the table below:

CLASS	DR	FΔy (PSI)
100	25	129
150	18	364
200	14	815

Pipe shall withstand, without failure at 73°F, an impact of a falling missile, TUP C, at the following levels (per ASTM D 2444):

Pipe Size (IN.)	Impact (FT./LBS.)
4	100
6	100
8	100
10	120
12	120

There shall be no visible evidence of shattering or splitting when the energy is imposed.

Randomly selected samples tested in accordance with ASTM D 1599 shall withstand, without failure, pressures listed below when applied in 60-70 seconds.

Class	Minimum Burst Pressure At 73°F (PSI)
100	535
150	755
200	985

Pipe for this Project shall conform with the specifications for AWWA C 900, DR 18 PVC pipe material for diameter sizes 4-inches through 12 inches and AWWA C 905, DR 25 PVC pipe material for diameter sizes 14 inches through 36-inches unless otherwise indicated on the Plans.

2.03 PVC (POLYVINYL CHLORIDE) GRAVITY PIPE

A. Pipe shall conform to the requirements of ASTM D 3034 for SDR 35 gravity pipe, unless otherwise indicated on the Plans.

B. All pipe joints shall be of the bell and spigot type with electrometric seals and conform to the requirements of ASTM D 3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe. Gasket material shall conform to the requirements of ASTM F 477.

C. All fittings shall be fabricated from pipe meeting the requirements of these standards. Fabricated miter joints shall be reinforced by fusion heat welding. All fittings shall be approved for use by the pipe manufacturer and shall be capable of accepting bell and spigot connections.

1. There shall be no sign of flaking or disintegration when immersed in anhydrous acetone for 20 minutes as described in ASTM D 2152.

D. All pipe shall be from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM 1784.

E. Minimum pipe stiffness at 5 percent deflection shall be 46 PSI for all sizes when tested in accordance with ASTM D 2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading".

F. Each pipe shall be identified with the name of manufacturer, nominal size, cell classification, ASTM designation F 1803, the pipe stiffness designation "PS-46" and manufacturer's date code.

2.04 NSF / ANSI STANDARD 61

Piping, fittings, and appurtenances in contact with potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61 as being suitable for contact with potable water.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE

A. All pipe, fittings, etc., shall be carefully handling and protected against damage, impact shocks and free fall. All pipe handling equipment shall be acceptable to the Engineer. Pipe shall not be placed directly on rough ground, but shall be supported in a manner which will protect the pipe against injury whenever stored at the Site. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

B. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe. Damaged pipe shall be replaced with new undamaged sections of pipe.

C. Before placement of the pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the Work. As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, rocks and any other debris following completion of pipe laying prior to testing, disinfecting and placing the completed pipeline in service.

D. Pipe shall be laid directly on the imported bedding material. No blocking will be permitted and the bedding shall be such that it forms a continuous, solid bearing for the

full length of the pipe. Bell holes shall be formed at the ends of the pipe to prevent joint loading at the bells or couplings.

E. Where necessary to raise or lower the pipe grade due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer.

F. No pipe shall be installed upon a foundation into which frost has penetrated or any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.

G. Immediately before jointing bell and spigot pipe, both the bell and spigot end of the pipe shall be thoroughly cleaned and lubricated with an approved vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper alignment. Tilting of the pipe to insert the spigot into the bell will not be permitted.

H. Solvent-welded and heat-fused joints shall be carefully and thoroughly cleaned immediately before jointing the pipe. Particular care shall be taken in making solvent-welded joints to ensure a uniform, homogeneous and complete bond.

I. Pipe installation shall conform with Technical Specification Section 02221 - Trenching, Backfilling and Compacting. If this installation of pipe section and Section 02221 conflict, the most stringent specification shall apply.

END OF SECTION

SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide concrete formwork, bracing, shoring, supports, and false work, in accordance with the Contract Documents.

B. Work included in this Section: Principal items are:

1. Furnishing, erection, and removal of forms.

2. Shoring and bracing of formwork.

3. Setting of embedded items and pipe sleeves for mechanical and electrical work under direction of respective trade.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.

1. Section 03200 - Reinforcement Steel

2. Section 03290 - Joints in Concrete Structures

3. Section 03300 - Cast-in-Place Concrete

4. Section 03315 - Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Except as otherwise indicated, the current editions of the following apply to the Work of this Section:

1.	PS 1	U.S. Product Standard for Concrete Forms, Class 1
2.	PS 20	American Softwood Lumber Standard
3.	ACI 117	Standard Tolerances for Concrete Construction and Materials
4.	ACI 347	Recommended Practice for Concrete Formwork

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall, in accordance with the requirements in the Specification Section 01300 – Contractor Submittals, submit detailed drawings of the false work proposed to be used. Such drawings shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the false work, means of protecting existing construction which supports false work, and typical soil conditions.

B. The Contractor shall, in accordance with the requirements in the Specification Section 01300 – Contractor Submittals, submit the following:

1. Form ties and all related accessories, including taper tie plugs, if taper ties are used.

2. Form gaskets.

C. The Contractor shall provide concrete construction joints and expansion joints of the types and locations indicated on the Plans. The Contractor shall submit shop drawings showing the proposed location and type of required construction for any joints not shown on the Plans, and the sequence of forming and concrete placing operations.

D. Forms and false work to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 PSF (minimum). The minimum design load for combined dead and live loads shall be 100 PSF.

E. The Contractor shall design formwork prior to fabrication, placing the order, or use on the jobs.

F. The Contractor shall design joints in forms to remain mortar-tight and withstand placing pressures without bulging outward or creating surface patterns.

G. Calculations shall be signed and sealed by a Professional Civil or Structural Engineer registered in the State of California for both the forming system and the stresses induced on the form system.

H. Suitable and effective means shall be provided for holding adjacent edges and end panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets or similar surface defects in the finished concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete.

1.05 QUALITY ASSURANCE

A. The Contractor shall comply with the requirements of California Division of Occupational Health and Safety Construction Safety Orders Section 1717 and OSHA Part 1926, Section 1926.701 that apply to the Work of this Section. The Contractor shall prepare and maintain at least one copy of the required Plans at the site. Design of the structures shown on the Plans does not include any allowance or consideration for imposed construction loads. The Contractor shall provide forms, shoring and false work adequate for imposed live and dead loads, including equipment, height of concrete drop, concrete and foundation pressures, stresses, lateral stability, and other safety factors during construction.

B. Tolerances: The Contractor shall employ formwork complying with ACI 347 Guide to Formwork for Concrete, except as exceeded by the requirements of regulatory agencies, or as otherwise indicated or specified. The Contractor shall design and construct formwork to produce finished concrete conforming to tolerances given in ACI 117.

PART 2 - PRODUCTS

2.01 GENERAL

A. Except as otherwise expressly accepted by the Engineer, all lumber brought on the Site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:

Walls:	Steel or plywood panel
Columns:	Steel, plywood or fiberglass
Roof and Floor:	Plywood
All Other Work:	Steel panels, plywood or tongue and groove lumber

B. Form materials which may remain or leave residues on or in the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

2.02 FORM AND FALSE WORK MATERIALS

A. Materials for concrete forms, formwork, and false work shall conform to the following requirements:

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class I, and shall be edge sealed.

3. Form materials shall be metal, wood, plywood, or other approved material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

2.03 FORM TIES

A. Form ties with integral waterstops shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties shall be Burke Penta-Tie System by The Burke Company; Richmond Snap-Tys by the Richmond Screw Anchor Company; or equal.

B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when approved by the Engineer. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie. Use Burke Taper-Tie System by The Burke Company; Taper-Ty by the Richmond Screw Anchor Company; or equal.

2.04 FORM COATING

A. Non-grainrising and nonstaining resin or polymer type that will not leave residual matter on surface of concrete or adversely effect bonding to concrete of paint, plaster, mortar, protective coatings, waterproofing or other applied materials. Coatings containing mineral oils, paraffins, waxes or other nondrying ingredients, are not permitted. For concrete surfaces contacting potable stored water, use only coatings and form-release agents that are completely nontoxic.

2.05 FORM JOINT SEALERS

A. For joints between form panels, use resilient foam rubber strips, non-hardening plastic-type caulking compound free of oil, or waterproof pressure-sensitive plastic tape of minimum 8 mil thickness and 2 inches width. For form tie holes, use rubber plugs, plastic caulking compound, or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced at no increased cost to the Owner. The Contractor shall provide worker protection from protruding reinforcement bars in accordance with applicable safety codes. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms, false work, and shoring shall comply with applicable local, state and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Drawings, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

C. Unless otherwise indicated, exterior corners in concrete members shall be provided with ¾ inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

D. The Contractor shall notify the Engineer at least 48 hours prior to concrete placement so the completed formwork can be inspected.

E. Final inspection will be made only after all formwork, embeds, blowouts, screeds, ties, final adjustments, and related work have been completed by the Contractor.

F. The Contractor shall correct defective work identified by the Engineer, prior to delivery of the concrete.

G. Neither the review of the Contractor's drawings nor inspection of forms by the Engineer shall relieve the Contractor of responsibility for the adequacy of the forms nor from the necessity for remedying all defects which may develop or become apparent with use. The Engineer may at any time condemn any section or sections of the forms found

deficient. The Contractor shall promptly remove the condemned forms from the Work and replace them.

3.02 FORM DESIGN

A. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8 inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the Engineer. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 03300 - Cast-in-Place Concrete. The size, number, and location of such form windows shall be as acceptable to the Engineer.

B. Wall Forms:

1. All walls shall be formed by methods acceptable to the Engineer and to the correct elevations and location illustrated on the Plans.

2. Pouring Openings:

a) The minimum pouring opening size shall be 18” x 18”.

b) The bottom of the lower openings shall be no more than 48 inches from the top of the wall-footing.

c) The horizontal centerline distance between such openings shall not exceed 96 inches nor shall the distance between the nearest opening and the bulkhead for the vertical joint exceed 36 inches.

d) The vertical centerline distance between horizontal rows of openings shall not exceed 96 inches.

e) Under no circumstances shall forming be such that the drop of concrete in the forms will exceed 4 feet in any one place.

3.03 CONSTRUCTION

A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is shown. Not less than 1 inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties:

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with non-shrink grout as specified for "Finish of Concrete Surfaces" in Section 03315 - Grout. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls which are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.

D. Embedded Items:

1. Before the placement of concrete within the forms, each trade having embedded items, including waterstops within the forms and affected by the pour, shall certify that all items are properly located and braced. This certification shall be provided by the Contractor to the Engineer at least 48 hours in advance of placement.

3.04 EMBEDDED PIPING AND ROUGH HARDWARE

A. The Contractor shall consult with all trades which require openings for the passage of pipes, conduits and other inserts, and properly and accurately install the necessary pipe sleeves, anchors, or other required inserts, and properly size the equipment pads. The Contractor shall reinforce openings as indicated and required. The Contractor shall locate conduits or pipes so as not to reduce the strength of the construction, and in no case, place pipes, other than conduits in a slab 4-1/2 inches or less in thickness. The Contractor shall not embed conduit having an outside diameter greater than 1/3 of the thickness of the slab in a concrete slab, nor place conduit below bottom reinforcing steel or over top reinforcing steel. Conduits may be embedded in walls, provided they are not larger in outside diameter than 1/3 the thickness of the wall, are not spaced closer than three diameters on center, and do not impair the strength of the structure. The Contractor shall support embedded pipes and conduits independently from reinforcing steel in a manner to prevent metallic contact, and thereby, prevent electrolytic deterioration. The Contractor shall place embedded pipes and conduits as nearly as possible to the centerline of the concrete section. The Contractor shall submit all conduit, piping and other wall penetrations, reinforcements and anchor bolt sizing and locations for review and approval.

3.05 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this Work shall be accomplished with care so as to avoid injury to the concrete. No heavy loading on green, insufficiently cured concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms for supported slab, but not shoring, shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28 day strength specified in Section 03300 - Cast-in-Place Concrete; provided, that no forms shall be disturbed or removed under an individual panel or until before the concrete in the adjacent panel or unit has attained 75 percent of the specified 28 day strength and has been in place for a minimum of 7 days. The time required to establish said strength shall be as determined by the Engineer from several test cylinders obtained by the Contractor for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7 day minimum, then that time shall be used as the minimum length of time. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the Engineer.

B. The Contractor shall not backfill against walls until the top slab is in place and all concrete has obtained compressive strength equal to the specified 28 day compressive strength.

C. Immediately upon removal of the forms, the concrete surfaces shall be thoroughly wetted and shall be kept wet until the curing compound is applied or other curing procedure made effective, in accordance with the specification requirements.

D. The Contractor shall assume the responsibility for damage resulting from improper and premature removal of forms.

3.06 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be filled with non-shrink grout.

3.07 MAINTENANCE OF FORMS

A. Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a non-staining mineral oil or other lubricant acceptable to the Engineer. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the Contractor shall perform the oiling at least 2 weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.08 FALSE WORK

A. The Contractor shall be responsible for the design, engineering, construction, maintenance, and safety of all false work, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the

provisions of the OSHA Safety and Health Standards for Construction, and the requirements of the California Division of Industrial Safety.

3.09 REMOVAL OF SHORING AND FALSE WORK

A. The Contractor shall not remove shoring and false work until 21 days after concrete placement, or concrete has attained at least 90 percent of the 28 day design compressive strength as demonstrated by control test cylinders, but not sooner than 14 days. If testing is competed to review the 90 percent compressive strength, the Contractor shall incur the cost.

3.10 LOAD RESTRICTION

A. The Contractor shall not impose construction, equipment or permanent loads on columns, supported slabs, or supported beams until concrete has attained the 28 day design compressive strength.

END OF SECTION

SECTION 03200 - REINFORCEMENT STEEL

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide concrete reinforcement steel, welded wire fabric, couplers, concrete inserts, wires, clips, supports, chairs, spacers, and other accessories, complete, all in accordance with the Contract Documents.

B. Work Included in this Section: Principal items are:

1. Furnishing and placing bar and mesh reinforcing for cast-in-place concrete.

2. Furnishing reinforcing steel bars for masonry, including delivery to the site.

3. Submittals.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03100 - Concrete Formwork

2. Section 03300 - Cast-in-Place Concrete

3. Section 03315 - Grout

4. Section 03400 – Precast Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Commercial Standards (Current Edition):

1.	ACI 315	Details and Detailing of Concrete Reinforcement
2.	ACI 318	Building Code Requirements for Structural Concrete
3.	CRSI MSP	Concrete Reinforcing Steel Institute Manual of Standard Practice
4.	CRSI PRB	Concrete Reinforcing Steel Institute Placing Reinforcing Bars
5.	WRI	Manual of Standard Practice for Welded Wire Fabric

6. AWS D 1.4 Structural Welding Code - Reinforcing Steel

7. ACI 117 Standard Tolerance for Concrete Construction Materials

D. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 82: Specification for Steel Wire, Plain, for Concrete Reinforcement

2. ASTM A 185: Specification for Welded Steel Wire Fabric, Plain, for Concrete Reinforcement

3. ASTM A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

4. ASTM A 706: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement

5. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bars

E. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish shop bending diagrams, placing lists, and drawings of all reinforcement steel before fabrication in accordance with the requirements of the Specification Section 01300 – Contractor Submittals.

B. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt of the Notice to Proceed. Details of reinforcement steel for fabrication and erection shall conform to ACI 315 and the requirements indicated. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch, measured to the intersection of the extensions (tangents for bars of circular cross-section) of the outside surface. The shop drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.

C. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, the Contractor shall submit manufacturer's literature including instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop drawings which show the location of each coupler with details of how they are to be installed in the formwork.

D. If reinforcement steel is spliced by welding at any location, the Contractor shall submit mill test reports which shall include the information necessary for the determination of the carbon equivalent as specified in AWS D 1.4. The Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; a mere statement that AWS procedures will be followed will not be acceptable.

1.05 QUALITY ASSURANCE

A. If requested by the Engineer, the Contractor shall furnish samples from each heat of reinforcement steel delivered in a quantity adequate for testing. Costs of initial tests will

be paid by the Contractor. Costs of additional tests due to material failing initial tests shall also be paid by the Contractor.

B. If reinforcement steel is spliced by welding at any location, the Contractor shall submit certifications of procedure qualifications for each welding procedure used and certification of welder qualifications, for each welding procedure, and for each welder performing the Work. Such qualifications shall be as specified in AWS D 1.4.

C. If requested by the Engineer, the Contractor shall furnish samples of each type of welded splice used in the Work in a quantity and of dimensions adequate for testing. At the discretion of the Engineer, radiographic testing of direct butt welded splices will be performed. The Contractor shall provide assistance necessary to facilitate testing. The Contractor shall repair any weld which fails to meet the requirements of AWS D 1.4. The costs of testing will be paid by the Contractor. The costs of all tests which fail to meet specified requirements shall also be paid by the Contractor.

PART 2 - PRODUCTS

2.01 MATERIAL REQUIREMENTS

A. Materials which may remain or leave residues on or within the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

2.02 REINFORCEMENT STEEL

A. Reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement or as otherwise indicated.

2. All welded reinforcement, specifically detailed or otherwise indicated, shall be low-alloy Grade 60 deformed bars conforming to the requirements of ASTM A 706.

3. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details indicated; provided, that welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either provided in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded wire fabric with longitudinal wires larger than W4 size shall be provided in flat sheets only.

4. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 82.

5. Tie wire shall be Annealed Steel, 14 gauge minimum.

B. Accessories:

1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. All bar supports shall meet the requirements of the CRSI Manual of Standard Practice, Chapter 3, including special requirements for supporting epoxy-coated reinforcing bars. Wire bar supports shall be CRSI

Class 1 for maximum protection with a 1/8 inch minimum thickness of plastic coating which extends at least ½ inch from the concrete surface. Plastic shall be gray in color.

2. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775.

2.03 MECHANICAL COUPLERS

A. Mechanical couplers shall be provided where indicated and where approved by the Engineer. The couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.

B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied. This shall apply to all mechanical splices, including those splices intended for future connections.

C. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross-section of the bar.

2.04 WELDED SPLICES

A. Welded splices shall be provided where indicated and where approved by the Engineer. All welded splices of reinforcement steel shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars which are connected.

B. Provided materials shall be capable of conforming to the Weld Splice requirements of AWS D 1.4.

2.05 EPOXY GROUT

A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall be in conformance with Section 03315 - Grout.

2.06 MANUFACTURERS

A. Couplers/welded splices shall be manufactured by one of the following or equal:

1. Lenton Form Saver by Erico Products

2. Dowel Bar Splicer System by Richmond Screw Anchor Company

2.07 NSF / ANSI STANDARD 61

A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 GENERAL

A. All reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the Uniform Building Code and the supplementary requirements indicated herein.

3.02 FABRICATION AND DELIVERY

A. The Contractor shall conform to CRSI MSP, Chapters 6 and 7, except as otherwise indicated or specified. The Contractor shall bundle reinforcement and tag with suitable identification to facilitate sorting and placing, and transport and storage at the site so as not to damage material. The Contractor shall keep a sufficient supply of tested, approved, and proper reinforcement at the site to avoid delays.

B. Bending and Forming: The Contractor shall bend bars of indicated size and accurately form in accordance with the requirements of ACI 315 and ACI 318 to shapes and lengths indicated on the Plans and required by methods not injurious to materials. The Contractor shall not heat reinforcement for bending. Bars with kinks or bends not conforming with approved shop drawings will be rejected.

C. Fabricating Tolerance: All fabrication of reinforcing bars shall meet the requirements of ACI 117.

D. Reinforcing Bars for Masonry: The Contractor shall detail and fabricate bars at the shop, ready for installation by masons.

3.03 PLACING

A. Reinforcement steel shall be accurately positioned and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangars which are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the Contractor shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.

B. Limitations on the use of bar support materials shall be as follows:

1. Concrete Dobies: Permitted at all locations except where architectural finish is required.

2. Wire Bar Supports: Permitted only at slabs over dry areas, interior dry wall surfaces, and exterior wall surfaces.

3. Plastic Bar Supports: Permitted at all locations except on grade.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Owner.

E. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318 except where in conflict with the requirements of the UBC.

F. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to the approval of the Engineer.

G. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than 30 inches on center, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.

H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on center in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be allowed.

I. Epoxy-coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating. Non-abrasive slings made of nylon and similar materials shall be used. Specially coated bar supports shall be used. All chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.

J. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars. When used to space the reinforcing bars from wall forms, the forms and bars shall be located so that there is no deflection of the accessory when the forms are tightened into position.

3.04 SPLICES

A. Splicing shall be in accordance with ACI 318, unless otherwise noted on the Plans.

B. Vertical Bars: Except as specifically detailed or otherwise indicated, splicing of vertical bars in concrete is not permitted, except at the indicated or approved horizontal construction joints or as otherwise specifically detailed.

C. Horizontal Bars: Except as specifically detailed or otherwise indicated, splicing of horizontal bars in concrete is not permitted.

D. Mechanical Couplers: Unless otherwise indicated or approved by the Engineer, use of mechanical couplers is not permitted.

E. Welding: Except as specifically detailed or otherwise indicated, welding of reinforcing bars is not permitted.

3.05 ADDITIONAL REINFORCING

A. The Contractor shall provide additional reinforcing bars at sleeves and openings as indicated on the Plans.

3.06 WELDED WIRE MESH

A. The Contractor shall install necessary supports and chairs to hold the wire mesh in place during concrete pours. The Contractor shall straighten mesh to lay in a flat plane and bend mesh as shown or required to fit work. The Contractor shall provide laps of no less than one complete mesh, unless otherwise detailed, and shall tie every other wire at laps. Roll mesh is not acceptable.

3.07 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

A. Hole Preparation:

1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than 0.25 inch greater than the diameter of the outer surface of the reinforcing bar deformations.

2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless noted otherwise.

3. The hole shall be drilled by methods which do not interfere with the proper bonding of epoxy.

4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes to be drilled shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.

5. The hole shall be blown clean with clean, dry compressed air to remove all dust and loose particles.

6. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that ensures that excess material will be expelled from the hole during dowel placement.

7. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

3.08 CLEANING AND PROTECTION

A. Reinforcing steel delivered to the jobsite shall be suitably stored off the ground and protected from oils, mud, concrete splatter and all conditions conducive to corrosion until embedded in concrete.

B. The surfaces of all reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be reinspected and, if necessary, recleaned.

END OF SECTION

SECTION 03320 - UNDERSLAB VAPOR BARRIER

PART 1 -- GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing moisture barrier and sand under concrete slabs-on-grade.

B. Related Sections:

1. Prepare subgrade according to Section 02200 and/or the Soils Report.
2. Concrete is specified in Section 03300.

1.02 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product Data: Include independent laboratory test results showing compliance with ASTM and ACI Standards. Include manufacturer's installation instructions for placement, seaming, and pipe boot installation.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

Protect products against damage during field handling and installation.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

A. Stego Wrap Vapor Retarder by Stego Industries

B. Vapor-Block by Raven Industries

C. Architect approved equal

2.02 MATERIALS

A. Vapor Retarder must have the following qualities:

1. 10 mil thickness minimum.
2. Permeance of 0.01 UP perms as tested by ASTM E154.
3. Puncture resistance of 2,600 grams per ASTM D1709, Method B.
4. ASTM E 1745 Class A (Plastics) after conditioning testing.

B. Vapor Retarder Tape:

1. Water Vapor Transmission Rate :ASTM E 96, 0.3 perms or lower
2. Minimum 8-mils thick
3. Minimum 4 inches wide
4. Manufactured from High Density Polyethylene
5. Pressure Sensitive Adhesive

C. Pipe Boots: Construct from vapor barrier sheeting material and pressure sensitive tape in accordance with manufacturer's instructions.

D. Sand: Clean yard sand, free from excessive dirt, debris, organic matter, and fines smaller than No. 200 sieve size.

PART 3 -- EXECUTION

3.01 INSPECTION

A. Below grade and grading work and items penetrating moisture barrier shall be completed prior to start of installation.

B. Examine the areas and conditions under which work of this Section will be performed.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION REQUIREMENTS

A. Vapor Barrier Sheeting:

1. Install in accordance with manufacturer's instructions and ASTM E1643.
2. Unroll with the longest dimension parallel with the direction of the pour.
3. Lap vapor barrier over footings and seal to foundation walls.
4. Overlap joints 6-inches and seal with pressure sensitive tape.
5. Seal penetrations, including pipes, with pipe boot.
6. Penetrations through vapor barrier sheeting except for reinforcing steel and permanent utilities are not permitted.
7. Repair damaged areas by cutting patches of vapor barrier sheeting, overlapping damaged area 6-inches and taping all four sides with pressure sensitive tape.

B. Sand Cushion:

1. Provide 2-inch layer over moisture barrier, unless otherwise indicated.
2. Spread over surfaces required and work to fill voids; leave in stable condition with finished surfaces reasonably uniform at established grade.

END OF SECTION

SECTION 03290 - JOINTS IN CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide joints in concrete at the locations indicated, complete, in accordance with the Contract Documents.

B. Waterstops shall be provided in all construction and expansion joints of hydraulic or below grade structures unless specifically noted otherwise in the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.

1. Section 03100 - Concrete Formwork

2. Section 03200 - Reinforcement Steel

3. Section 03300 - Cast-in-Place Concrete

4. Section 07900 – Sealants and Caulking

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

D. Federal Specifications (Current Edition):

1. TT-S-0227E(3): Sealing Compound, Elastomeric Type, Multi-Component for Caulking, Sealing, and Glazing Buildings and Other Structures.

2. SS-S-210A: Sealing Compound for Expansion Joints.

E. U.S. Army Corps of Engineers Specifications:

1. CRD-C572: PVC Waterstop.

F. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bars

2. ASTM C 920: Specification for Elastomeric Joint Sealants

3. ASTM D 412: Test Methods for Rubber Properties in Tension

4. ASTM D 624: Test Method for Rubber Property - Tear Resistance

5. ASTM D 638: Test Method for Tensile Properties of Plastics

6. ASTM D 746: Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

7. ASTM D 747: Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam

8. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bar

9. ASTM D 1056: Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

10. ASTM D 1752: Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

11. ASTM D 2000: Standard Classification System for Rubber Product in Automotive Applications

12. ASTM D 2240: Test Method for Rubber Property - Durometer Hardness

13. ASTM D 2241: Specification for Poly Vinyl Chloride (PVC) Pressure-Related Pipe (SDR-series)

1.04 TYPES OF JOINTS

A. Construction Joints: When fresh concrete is placed against a hardened concrete surface, the joint between the two pours is called a construction joint. Unless otherwise indicated, all joints in water bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated. The surface of the first pour may also be required to receive a coating of bond breaker as indicated.

B. Contraction Joints: Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the first pour, which shall be coated with a bond breaker. The slab reinforcement shall be stopped 4-1/2 inches from the joint; which is provided with a sleeve-type dowel, to allow shrinkage of the concrete of the second pour. Waterstop and/or sealant groove shall also be provided unless otherwise indicated on the Plans.

C. Expansion Joints: To allow the concrete to expand freely, a space is provided between the two pours; the joint shall be formed as indicated. This space is obtained by placing a filler joint material against the first pour, which acts as a form for the second pour. Unless otherwise indicated, all expansion joints in water bearing members shall be provided with a center-bulb type waterstop.

D. Control Joints: The function of the control joint is to provide a weaker plane in the concrete, where shrinkage cracks will likely occur. A groove, of the shape and dimensions indicated, is formed or saw-cut in the concrete. This groove is filled afterward with a joint sealant material as specified.

1.05 CONTRACTOR SUBMITTALS

A. The Contractor shall submit the following in compliance with Section 01300 – Contractor Submittals:

1. Waterstops: Before production of the required materials, qualification samples shall be submitted. Such samples shall consist of extruded or molded sections of each size or shape to be used, and shall be accomplished so that the material and workmanship represents in all respects the material to be provided under this Contract. The balance of the material to be used under this Contract shall not be produced until after the Engineer has reviewed the qualification samples.

2. Joint Sealant: Before ordering the sealant material, the Contractor shall submit sufficient data to show general compliance with the requirements of the Contract Documents.

3. Before the sealant is used on the job, the Contractor shall submit certified test reports from the sealant manufacturer on the actual batch of material being supplied indicating compliance with the above requirements.

4. Shipping Certification: The Contractor shall furnish written certification from the manufacturer as an integral part of the shipping form, to show that all of the material shipped to this project meet or exceed the physical property requirements of the Contract Documents. Supplier certificates are not acceptable.

5. Joint Location: The Contractor shall submit placement shop drawings illustrating the location and type of all joints for each structure.

1.06 QUALITY ASSURANCE

A. Waterstop Inspection: All waterstop field joints shall be subject to rigid inspection, and no such work shall be scheduled or started without the Contractor having made prior arrangements with the Engineer to provide for the required inspections. Not less than 48 hours' notice shall be given to the Engineer for scheduling such inspections.

B. All field joints in waterstops shall be subject to rigid inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joins shall be replaced with material which shall pass said inspection, and all faulty material shall be removed from the site and disposed of by the Contractor at no increase in cost to the Owner.

C. The following waterstop defects represent a partial list of defects which shall be grounds for rejection:

1. Offsets at joints greater than 1/16 inch or 15 percent of material thickness, at any point, whichever is less.

2. Exterior crack at joint, due to incomplete bond, which is deeper than 1/16 inch or 15 percent of material thickness, at any point, whichever is less.

3. Any combination of offset or exterior crack which will result in a net reduction in the cross-section of the waterstop in excess of 1/16 inch or 15 percent of material thickness, at any point, whichever is less.

4. Misalignment of joint which result in misalignment of the waterstop in excess of 1/2-inch in 10 feet.

5. Porosity in the welded joint as evidenced by visual inspection.

6. Bubbles or inadequate bonding which can be detected with a penknife test. If, while prodding the entire joint with the point of a penknife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.

D. Waterstop Samples: Before use of the waterstop material in the field, a sample of a fabricated mitered cross and a tee constructed of each size or shape of material to be used shall be submitted to the Engineer for review. These samples shall be fabricated so that the material and workmanship represent in all respects the fittings to be provided under this Contract. Field samples of fabricated fittings will be selected at random by the Engineer for testing by a laboratory at the Contractor's expense. When tested, PVC waterstops shall have a tensile strength across the joints equal to at least 600 PSI.

E. Construction Joint Sealant: The Contractor shall prepare adhesion and cohesion test specimens as indicated, at intervals of 5 working days while sealants are being installed.

F. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:

1. Sealant specimens shall be prepared between two concrete blocks (1 inch to 2 inches by 3 inches). Spacing between the blocks shall be 1 inch. Coated spacers (2 inches by 1 ½ inch by ½ inch) shall be used to ensure sealant cross-sections of ½ inch by 2 inches with a width of 1 inch.

2. Sealant shall be cast and cured according to manufacturer's recommendations except that the curing period shall be not less than 24 hours.

3. Following curing period, the gap between blocks shall be widened to 1-1/2 inch. Spacers shall be used to maintain this gap for 24 hours before inspection for failure.

1.07 WARRANTY

A. The Contractor shall furnish a 5 year written warranty of the entire sealant installation against faulty and/or incompatible materials and workmanship, along with a statement that it agrees to repair or replace, to the satisfaction of the Owner and at no additional cost to the Owner, any defects that appear during the warranty period.

PART 2 - PRODUCTS

2.01 GENERAL

A. All joint materials specified herein shall be classified by the Environmental Protection Agency as acceptable for potable water use.

2.02 PVC WATERSTOPS

A. General: Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the requirements of these Specifications. No reclaimed or scrap material shall be used. The Contractor shall obtain from the waterstop manufacturer and submit to the Engineer current test reports and a written certification that the material to be shipped meets the

physical requirements outlined in the U.S. Army Corps of Engineers Specification CRD-C572 and those listed herein.

B. Flatstrip and Center-Bulb Waterstops: At no place shall the thickness of flatstrip waterstops, including the center-bulb type, be less than 3/8 inch. Flatstrip and center-bulb waterstops shall be manufactured by Kirkhill Rubber Co., Brea, California; Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal.

C. Multi-Rib Waterstops: Multi-rib waterstops, where required, shall be manufactured by Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal. Prefabricated joint fittings shall be used at all intersections of the ribbed-type waterstops.

D. Other Types of Waterstops: When other types of waterstops not listed above are required and indicated, they shall be subjected to the same requirements as those listed herein.

E. Waterstop Testing Requirements: When tested in accordance with the standards, the waterstop material shall meet or exceed the following requirements:

Physical Property, Sheet Material	Value	ASTM Std.
Tensile Strength-min (PSI)	1,750	D 638, Type IV
Ultimate Elongation-min (%)	350	D 638, Type IV
Low Temp Brittleness-max (degrees *F*)	-35	D 746
Stiffness in Flexure-min (PSI)	400	D 747
Accelerated Extraction (CRD-C572)		
Tensile Strength-min (PSI)	1,500	D 638, Type IV
Ultimate Elongation-min (%)	300	D 638, Type IV
Effect of Alkalies (CRD-C572)		
Change in Weight (%)	+0.25/-0.10	-----
Change in Durometer, Shore A	+5	D 2240
Finish Waterstop		
Tensile Strength-min (PSI)	1,400	D 638, Type IV
Ultimate Elongation-min (%)	280	D 638, Type IV

2.03 JOINT SEALANT

A. Joint sealant shall be polyurethane polymer designed for bonding to concrete which is continuously submerged in water. No material will be acceptable which has an unsatisfactory history as to bond or durability when used in the joints of water retaining structures.

B. Joint sealant material shall meet the following requirements (73°*F* and 50% relative humidity):

Work Life	45 - 180 minutes

Time to Reach 20 Shore "A" Hardness (at 77°*F*, 200 gr quantity)	24 hours, maximum
Ultimate Hardness (ASTM D 2240)	20 - 45 Shore "A"
Tensile Strength (ASTM D 412)	200 PSI, minimum
Ultimate Elongation (ASTM D 412)	400%, minimum
Tear Resistance (Die C ASTM D 624)	75 pounds per inch of thickness, minimum
Color	Light Gray

C. All polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:

1. Sealant shall be two-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ANSI/ASTM C 920 or Federal Specification TT-S-0227 E(3) for two-part material, as applicable.

2. For vertical joints and overhead horizontal joints, only "nonsag" compounds shall be used; all such compounds shall conform to the requirements of ANSI/ASTM C 920 Class 25, Grade NS, or Federal Specification TT-S-0227 E(3), Type II, Class A.

3. For plane horizontal joints, the self-leveling compounds which meet the requirements of ANSI/ASTM C 920 Class 25, Grade P, or Federal Specification TT-S-0227 E(3), Type I shall be used. For joints subject to either pedestrian or vehicular traffic, a compound providing nontracking characteristics, and having a Shore "A" hardness range of 35 to 45, shall be used.

4. Primer materials, if recommended by the sealant manufacturer, shall conform to the printed recommendations of the sealant manufacturer.

D. All sealants, wherever shown, or required hereunder shall be PSI-270 as manufactured by Polymeric Systems Inc.; Elastothane 227R as manufactured by Pacific Polymers; Sikaflex 2C, as manufactured by Sika Corporation, or equal.

E. Sealants for nonwaterstop joints in concrete shall conform to the requirements of Section 07900 – Sealants and Caulking.

2.04 JOINTS MATERIALS

A. Bearing Pad: Bearing pad to be neoprene conforming to ASTM D 2000 BC 420, 40 durometer hardness unless otherwise indicated.

B. Neoprene Sponge: Sponge to be neoprene, closed-cell, expanded, conforming to ASTM D 1056, Type 2C3-E1.

C. Joint Filler:

1. Joint filler for expansion joints in water holding structures shall be neoprene conforming to ASTM D 1056, Type 2C5-E1.

2. Joint filler material in other locations shall be of the preformed nonextruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All nonextruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 for Type I, except as otherwise indicated.

2.05 BACKING ROD

A. Backing rod shall be an extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant used and shall have a tensile strength of not less than 40 PSI and a compression deflection of approximately 25% at 8 PSI. The rod shall be 1/8 inch larger in diameter than the joint width except that a 1 inch diameter rod shall be used for a ¾ inch wide joint.

2.06 BOND BREAKER

A. Bond breaker shall be Super Bond Breaker as manufactured by Burke Company, San Mateo, California; Select Cure CRB as manufactured by Select Products Co., Upland, California, or equal. It shall contain a fugitive dye so that areas of application will be readily distinguishable.

2.07 SLIP DOWELS

A. Slip dowels in joints shall be A 36 smooth epoxy-coated bars, as indicated on the Plans, and conforming to ASTM A 775.

2.08 PVC TUBING

A. PVC tubing in joints shall be Schedule SDR 13.5, conforming to ASTM D 2241.

2.09 NSF / ANSI STANDARD 61

A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 GENERAL

A. Waterstops of the type indicated shall be embedded in the concrete across joints as indicated. All waterstops shall be fully continuous for the extent of the joint. Splices necessary to provide such continuity shall be accomplished in conformance to printed instructions of manufacturer of the waterstops. The Contractor shall take suitable precautions and means to support and protect the waterstops during the progress of the Work and repair or replace at its own expense any waterstops damaged during the progress of the Work. All waterstops shall be stored so as to permit free circulation of air around the waterstop material.

B. When any waterstop is installed in the concrete on one side of a joint, while the other half or portion of the waterstop remains exposed to the atmosphere for more than 2 days, suitable precautions shall be taken to shade and protect the exposed waterstop from direct

rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

3.02 SPLICES IN WATERSTOPS

A. Splices in waterstops shall be performed by heat sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations. It is essential that:

1. The material not be damaged by heat sealing.

2. The splices have a tensile strength of not less than 60% of the unspliced material's tensile strength.

3. The continuity of the waterstop ribs and of its tubular center axis be maintained.

B. Butt joints of the ends of two identical waterstop sections may be made while the material is in the forms.

C. All joints with waterstops involving more than two ends to be joined together, and all joints which involve an angle cut, alignment change, or the joining of two dissimilar waterstop sections shall be prefabricated before placement in the forms, allowing not less than 24 inch long strips of waterstop material beyond the joint. Upon being inspected and approved, such prefabricated waterstop joint assemblies shall be installed in the forms and the ends of the 24 inch strips shall be butt welded to the straight run portions of waterstop in place in the forms.

D. Where a centerbulb waterstop intersects and is joined with a noncenterbulb waterstop, care shall be taken to seal the end of the centerbulb, using additional PVC material if needed.

3.03 JOINT CONSTRUCTION

A. Setting Waterstops: To eliminate faulty installation that may result in joint leakage, particular care shall be taken of the correct positioning of the waterstops during installation. Adequate provisions shall be made to support and anchor the waterstops during the progress of the Work and to ensure the proper embedment in the concrete. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints. The center axis of the waterstops shall be coincident with the joint openings. Maximum density and imperviousness of the concrete shall be ensured by thoroughly working it in the vicinity of all joints.

B. In placing flat-strip waterstops in the forms, a means shall be provided to prevent them from being folded over by the concrete as it is placed. Unless otherwise indicated, all waterstops shall be held in place with light wire ties on 12 inch centers which shall be passed through the edge of the waterstop and tied to the curtain of reinforcing steel. Horizontal waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked. In placing concrete around horizontal waterstops, with their flat face in a horizontal plane, concrete shall be worked under the waterstops by hand so as to avoid the formation of air and rock pockets.

C. In placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.

D. Waterstop in vertical wall joints shall stop 6 inches from the top of the wall where such waterstop does not connect with any other waterstop and is not to be connected to a future concrete placement.

E. Joint Location: Construction joints, and other types of joints, shall be provided where indicated. When not indicated, construction joints shall be provided at 25 foot maximum spacing for all concrete construction, unless noted otherwise. The location of all joints, of any type, shall be submitted for acceptance by the Engineer.

F. Joint Preparation: Special care shall be used in preparing concrete surfaces at joints where bonding between two sections of concrete is required. Unless otherwise indicated, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of Section 03300 - Cast-in-Place Concrete.

G. Premolded expansion joint material shall be installed with the edge at the indicated distance below or back from finished concrete surface, and shall have a slightly tapered, dressed, and oiled wood strip secured to or placed at the edge thereof during concrete placement, which shall later be removed to form space for sealing material.

H. The space so formed shall be filled with a joint sealant material as specified. In order to keep the two wall or slab elements in line the joint shall also be provided with a sleeve-type dowel, unless otherwise indicated on Plans.

I. Construction Joint Sealant: Construction joints in water-bearing floor slabs, and elsewhere as indicated, shall be provided with grooves, which shall be filled with a construction joint sealant. The material used for forming the grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant. After removing the forms from the grooves, all laitance and fins shall be removed, and the grooves shall be sandblasted. The grooves shall be allowed to become thoroughly dry, after which they shall be blown out; immediately thereafter, they shall be primed, bond breaker tape placed in the bottom of the groove, and filled with the joint sealant. The primer used shall be supplied by the same manufacturer supplying the sealant. No sealant will be permitted to be used without a primer. Care shall be used to completely fill the sealant grooves. Areas designated to receive a sealant filler shall be thoroughly cleaned, as outlined for the grooves, before application of the sealant.

J. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant before application. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant. All sealant shall achieve final cure at least 7 days before the structure is filled with water.

K. All sealant shall be installed by a competent waterproofing specialty contractor who has a successful record of performance in similar installations. Before Work is commenced, the crew performing the Work shall be instructed as to the proper method of application by a representative of the sealant manufacturer.

L. Thorough, uniform mixing of two-part, catalyst-cured materials is essential; special care shall be taken to properly mix the sealer before its application. Before any sealer is placed, arrange to have the crew performing the Work carefully instructed as to the proper method of mixing and application by a representative of the sealant manufacturer.

M. Any joint sealant which, after the manufacturer's recommended curing time for the job conditions of the Work hereunder, fails to fully and properly cure shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured

or partially cured sealant and primer, and shall be resealed with the indicated joint sealant. All costs of such removal, joint treatment, resealing and appurtenant work shall be at no additional cost to the Owner.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide finished structural concrete, complete, in accordance with the Contract Documents.

B. The following types of concrete are covered in this Section:

1. STRUCTURAL CONCRETE: Normal weight (145 PCF) concrete to be used in all cases except where noted otherwise in the Contract Documents.

2. LEAN CONCRETE: Concrete to be used for thrust blocks, anchor blocks, pipe trench cut-off blocks and cradles, where the preceding items are detailed on the Plans as unreinforced. Concrete to be used as protective cover for dowels intended for future connection.

C. The term "hydraulic structure" used in these Specifications refers to environmental engineering concrete structures for the containment, treatment, or transmission of water, or other fluids.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03100 - Concrete Formwork

2. Section 03200 - Reinforcement Steel

3. Section 03290 - Joints in Concrete Structures

4. Section 03315 – Grout

5. Section 07110 – Membrane Waterproofing

6. Section 09800 – Protective Coatings

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Buildings Officials (ICBO).

C. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

D. Federal Specifications:

1. UU-B-790A(1)(2): Building Paper, Vegetable Fiber (Kraft, Water-Proofed, Water Repellant and Fire Resistant)

E. Commercial Standards:

1. ACI 117: Standard Tolerances for Concrete Construction and Materials

2. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete

3. ACI 301: Specifications for Structural Concrete for Buildings

4. ACI 309: Consolidation of Concrete

5. ACI 315: Details and Detailing of Concrete Reinforcement

6. ACI 318: Building Codes Requirements for Reinforced Concrete

7. ACI 350R: Environmental Engineering Concrete Structures

F. ASTM Standards in Building Codes:

1. ASTM C 31: Practice for Making and Curing Concrete Test Specimens in the Field

2. ASTM C 33: Specification for Concrete Aggregates

3. ASTM C 39: Test Method for Compressive Strength of Cylindrical Concrete Specimens

4. ASTM C 40: Test Method for Organic Impurities in Fine Aggregates for Concrete

5. ASTM C 42: Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

6. ASTM C 88: Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

7. ASTM C 94: Specification for Ready-Mixed Concrete

8. ASTM C 136: Test Method for Sieve Analysis of Fine and Coarse Aggregates

9. ASTM C 138: Test Method for Unit Weight, Yield, and Air Content of Concrete

10. ASTM C 143: Test Method for Slump of Hydraulic Cement Concrete

11. ASTM C 150: Specification for Portland Cement

12. ASTM C 156: Test Method for Water Retention by Concrete Curing Materials

13. ASTM C 157: Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete

14. ASTM C 192: Practice for Making and Curing Concrete Test Specimens in the Laboratory

15. ASTM C 231: Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

16. ASTM C 260: Specification for Air-Entraining Admixtures for Concrete

17. ASTM C 289: Test Method for Potential Reactivity of Aggregates (Chemical Method)

18 ASTM C 309: Specification for Liquid Membrane-Forming Compounds for Curing Concrete

19. ASTM C 494: Specification for Chemical Admixtures for Concrete

20. ASTM C 107: Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

21. ASTM D 1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)

22. ASTM D 2419: Test Method for Sand Equivalent Value of Soils and Fine Aggregate

23. ASTM E 119: Method for Fire Tests of Building Construction and Materials

1.04 CONTRACTOR SUBMITTALS

A. Mix Designs: Before starting the Work and within 14 days of the Notice to Proceed, the Contractor shall submit to the Engineer, for review, preliminary concrete mix designs which shall illustrate the proportions and gradations of all materials proposed for each class and type of concrete specified herein in accordance with Specification Section 01300 – Contractor Submittals. The mix designs shall be checked and certified to conform to these Specifications by an independent testing laboratory acceptable to the Engineer to be in conformance with these Specifications. All costs related to such checking and testing shall be borne by the Contractor at no cost to the Owner.

B. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state-certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount of water allowed to be added at the site for the specific design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the site, when unloading began, and when unloading was finished.

C. The Contractor shall provide the following submittals in accordance with ACI 301:

1. Mill tests for cement.

2. Admixture certification. Chloride ion content must be included.

3. Aggregate gradation and certification.

4. Materials and methods for curing.

D. The Contractor shall provide catalog cuts and other manufacturer's technical data demonstrating compliance with the requirements indicated and specified herein for all admixtures used in the concrete mix design.

1.05 QUALITY ASSURANCE

A. GENERAL

1. Tests on component materials and for compressive strength and shrinkage of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

2. The cost of all laboratory tests requested by the Engineer for cement, aggregates, and concrete, will be borne by the Contractor. The laboratory must meet or exceed the requirements of ASTM C 1077.

3. Concrete for testing shall be supplied by the Contractor at no cost to the Owner and the Contractor shall provide assistance to the independent testing laboratory acceptable to the Engineer in obtaining samples, and disposal and clean up of excess material.

4. A minimum of one (1) set of concrete cylinders and a slump test shall be obtained for every major concrete placement. A minimum of one (1) set of concrete cylinders shall be obtained for all concrete structures, foundations and slabs. One (1) set of cylinders shall be obtained for every forty (40) yards of concrete placed for a particular pour. For instance, if the walls of a structure require eighty (80) yards of concrete; then two (2) sets of concrete cylinders shall be required. If concrete cylinders for compression testing and a slump test are not required, then the delivery tickets accompanying the concrete vendor's truck shall be forwarded to the Construction Manager.

B. Field Compression Tests:

1. Compression test specimens will be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. Each set of test specimens will consist of four (4) cylinders.

2. Compression test specimens for concrete shall be made in accordance with Section 9.2 of ASTM C 31. Specimens shall be 6-inch diameter by 12-inch high cylinders.

3. Compression tests shall be performed in accordance with ASTM C 39. One (1) test cylinder will be tested at 7 days and two (2) at 28 days. The remaining cylinder will be held to verify test results, if needed.

C. Evaluation and Acceptance of Concrete:

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5, "Concrete Quality", and as specified herein.

2. A statistical analysis of compression test results will be performed according to the requirements of ACI 214. The standard deviation of the test results shall not exceed 640 PSI, when ordered at equivalent water content as estimated by slump.

3. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.

4. When the standard deviation of the test results exceeds 640 PSI, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 PSI below or the average of any three (3) consecutive tests being below the specified compressive strength is 1 in 100. The required average strength shall be calculated by Criterion No. 3 of ACI 214 using the actual standard deviation.

5. All concrete which fails to meet the ACI requirements and these Specifications is subject to removal and replacement at no cost to the Owner.

D. Construction Tolerances: Set and maintain concrete forms and perform finishing operations so as to ensure that the completed Work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 117.

1. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise illustrated:

Item	Tolerance
Variation of the constructed linear outline from the established position in plan.	In 10 feet: ¼ inch In 20 feet or more: ½ inch
Variation from the level or from the grades shown.	In 10 feet: ¼ inch In 20 feet or more: ½ inch
Variation from the plumb.	In 10 feet: ¼ inch In 20 feet or more: ½ inch
Variation in the thickness of slabs and walls.	Minus ¼ inch; Plus ½ inch
Variation in the locations and sizes of slabs and wall openings.	Plus or minus ¼ inch

E. Floor Slab Surface Hardener:

1. Job Mockup: In a location designated by the Engineer, place a minimum 100 square feet floor mockup using materials and procedures proposed for use in the Project. Revise materials and procedures as necessary to obtain acceptable finish surface. Maintain the same controls and procedures used in the acceptable mockup throughout the Project.

2. Field Service: During job mockup and initial period of installation, the manufacturer of the surface hardener shall furnish the service of a trained, full-time representative to advise on proper use of the product. Notify surface hardener manufacturer at least three (3) days before initial use of the product.

3. Installer Qualifications: Installer shall have a minimum of three (3) years experience and shall be specialized in the application of dry shake surface hardeners.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. General:

1. All materials specified herein shall be classified by the Environmental Protection Agency as acceptable for potable water use within 30 days of application.

2. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one (1) brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

B. All materials furnished for the Work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of Section 2.5 of ACI 301 or the SSPWC.

D. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand Portland Cement conforming to ASTM C 150 for Type V. A minimum of 85 percent of cement by weight shall pass a 325 screen. A single brand of cement shall be used throughout the Work, and before its use, the brand shall be acceptable to the Engineer. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the Engineer if requested regarding compliance with these Specifications.

2. Water for mixing and curing shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section, only if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids concentration (over 1,000 mg/l) shall not be used.

3. Aggregates shall be obtained from pits acceptable to the Engineer, shall be nonreactive, and shall conform to ASTM C 33. Maximum size of coarse aggregate shall be as specified herein. Lightweight sand for fine aggregate will not be permitted.

a) Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock or a combination thereof. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size greater than ¾ inch. When the aggregates are proportioned for each batch of concrete the two size groups shall be combined. See the Paragraph in Part 2 entitled "Trial Batch and Laboratory Tests" for the use of the size groups.

b) Fine aggregates shall be natural sand or a combination of natural and manufactured sand that are hard and durable. When tested in accordance with ASTM D 2419, the sand equivalency shall not be less than 75 percent for an average of three samples, nor less than 70 percent for an individual test. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.

c) Combined aggregates shall be well graded from coarse to fine sizes, and shall be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

d) When tested in accordance with ASTM C 33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

e) When tested in accordance with ASTM C 33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

f) When tested in accordance with ASTM C 33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.

g) When tested in accordance with ASTM C 33, the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using sodium sulfate.

4. Ready-mix concrete shall conform to the requirements of ASTM C 94.

5. Admixtures: All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Admixtures shall be used in accordance with manufacturer's recommendations. If the use of an admixture is producing an inferior end result, discontinue use of the admixture. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be nontoxic after 30 days.

a) Set controlling and water reducing admixtures: Admixtures may be added at the Contractor's option to control the set, affect water reduction, and increase workability. The addition of an admixture shall be at no increase in cost to the Owner. The use of an admixture shall be subject to acceptance by the Engineer. Concrete containing an admixture shall be first placed at a location determined by the Engineer. Admixtures specified herein shall conform to the

requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

1) Concrete shall not contain more than one water-reducing admixture. Concrete containing an admixture shall be first placed at a location determined by the Engineer.

2) Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80°*F*, a set retarding admixture such as Plastocrete by Sika Corporation; Pozzolith 300R by Master Builders; Daratard by W. R. Grace; or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40°*F*, a noncorrosive set accelerating admixture such as Plastocrete 161FL by Sika Corporation; Pozzutec 20 by Master Builders; Daraset by W. R. Grace; or equal shall be used.

3) Normal range water reducer shall conform to ASTM C 494, Type A, WRDA 79 by W. R. Grace; Pozzolith 322-N by Master Builders; Plastocrete 161 by Sika Corporation; or equal. The quality of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

4) High range water reducer shall conform to ASTM C 494, Type F or G. Daracem 100 or WDRA 19 by W. R. Grace; Sikament FF or Sikament 86 by Sika Corporation; Rheobuild 1000 or Rheobuild 716 by Master Builders; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified. No more than 14 ounces of water reducer per sack of cement shall be used. Water reducer shall be considered as part of the mixing water when calculating water cement ratio.

5) If the high range water reducer is added to the concrete at the job site, it may be used in conjunction with the same water reducer added at the batch plant. Concrete shall have a slump of 3 inches + ½ inch before adding the high range water reducing admixture at the job site. The high range water-reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested before each day's operation of the job site system.

6) Concrete shall be mixed at mixing speed for a minimum of 30 mixer revolutions after the addition of the high range water reducer.

7) Flyash: Flyash shall not be used.

2.02 CURING MATERIALS

A. Materials for curing concrete as specified herein shall conform to the following requirements and ASTM C 309:

1. All curing compounds shall be white pigmented and resin based. Sodium silicate compounds shall not be allowed. Concrete curing compound shall be Spartan Cote Cure-Seal Hardener by the Burke Company; Super Rez Seal by Euclid Chemical Company; MB-429 as manufactured by Master Builders; or equal. Water-based resin curing compounds shall be used only where local air quality regulations prohibit the use of a solvent-based compound. Water-based curing compounds shall be Aqua Resincure by the Burke Company; Aqua-Cure by Euclid Chemical Company; Masterkure-W by Master Builders; or equal.

2. Polyethylene sheet for use as a concrete curing blanket shall be white, and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.

3. Polyethylene-coated water proof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, having a nominal thickness of 2 mils and permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A(1)(2). The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 gram per square centimeter of surface.

4. Polyethylene-coated burlap for use as concrete curing blanket shall be 4 mils thick, white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.

5. Curing mats for use in Curing Method 6 as specified herein, shall be heavy shag rugs or carpets or cotton mats quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

6. Evaporation retardant shall be a material such as Confilm as manufactured by Master Builders; Eucobar as manufactured by Euclid Chemical Company; or equal.

2.03 NONWATERSTOP JOINT MATERIALS

A. Materials for nonwaterstop joints in concrete shall conform to the following requirements:

1. Preformed joint filler shall be a nonextruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.

2. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the Engineer.

2.04 MISCELLANEOUS MATERIALS

A. Damp-proofing agent shall be an asphalt emulsion, such as Hydrocide 600 by Sonneborn; Damp-proofing Asphalt Coating by Euclid Chemical Company; Sealmastic by W. R. Meadows Inc., or equal.

B. Bonding agents shall be epoxy adhesives conforming to the following products for the applications specified:

1. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concresive Liquid (LPL), as manufactured by Master Builders; BurkEpoxy MV as manufactured by The Burke Company; or equal.

2. For bonding hardened concrete or masonry to steel, Sikadur 31 Hi-Mod Gel as manufactured by Sika Corporation; BurkEpoxy NS as manufactured by The Burke Company; Concresive Paste (LPL) as manufactured by Master Builders; or equal

2.05 CONCRETE DESIGN REQUIREMENTS

A. Mix Design:

1. General: Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the Work will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. In mix designs, the percentage of sand of the total weight of fine and coarse aggregate shall not exceed 41 for hydraulic structures or 50 for all other structures, unless noted otherwise. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the Engineer.

2. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content of concrete shall be not less than that specified in the following table:

Type of Work	Min. 28-Day Compressive Strength (PSI)	Max Size Aggregate (in)	Minimum Cement Per CU YD (lb)	Max W/C Ratio (by weight)
Structural Concrete:	5,000	3/4	658	0.45
Normal weight reinforced concrete (145 pcf)	5,000	3/4	658	0.45
Lean Concrete	4,500	3/4	611	0.45

NOTE: The Contractor is cautioned that the limiting parameters specified above are not a mix design. Additional cement or water-reducing agent may be required to achieve workability demanded by the Contractor's construction methods and aggregates. The Contractor is responsible for any costs associated with furnishing concrete with the required workability.

3. Adjustments to Mix Design: The mixes used shall be changed whenever such chance is necessary or desirable to secure the required strength, density, workability, and surface finish and the Contractor shall be entitled to no additional compensation because of such changes.

B. Consistency:

1. The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation, and which can be compacted by the vibratory methods herein specified to give the desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

Part of Work	Slump (in)
All concrete, unless noted otherwise	4 inches + 1/2-inch
With high range water reducer added	5 inches + 1/2-inch

C. Trial Batch and Laboratory Tests:

1. Before placing any concrete, a testing laboratory approved by the Engineer will prepare a trial batch of each class of structural concrete, based on the preliminary concrete mixes submitted by the Contractor. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor. All concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractor's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch will be prepared using the aggregates, cement and admixture proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage, and six compression test specimens from each batch. The cost of not more than three laboratory trial batch tests for each specified concrete strength will be borne by the Contractor. The Contractor shall furnish and deliver the materials in steel drums to the approved testing laboratory. Any additional trial batch testing required shall be performed by the testing laboratory at no additional cost to the Owner.

2. The determination of compressive strength will be made by testing 6-inch diameter by 12 inch high cylinders; made, cured and tested in accordance with ASTM C 192 and ASTM C 39. Three compression test cylinders will be tested at 7 days and 3 at 28 days. The average compressive strength for the three

cylinders tested at 28 days for any given trial batch shall not be less than 125 percent of the specified compressive strength.

3. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C 136. Values shall be given for percent passing each sieve.

4. In lieu of trial batch and laboratory tests specified in this Section, the Contractor may submit previously-designed, tested, and successfully-used concrete mixes, using materials similar to those intended for this project, together with a minimum of three certified test reports of the 28 day strength of the proposed concrete mix.

D. Shrinkage Limitation:

1. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21 day drying age or at 28 day drying age shall be 0.036 percent or 0.042 percent, respectively. Use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations apply only to structural concrete.

2. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

3. If the required shrinkage limitation is not met during construction, take any or all of the following actions, at no additional cost to the Owner for securing the specified shrinkage requirements. These actions may include changing the source of aggregates, cement and/or admixtures; reducing water content; washing of aggregate to reduce fines; increasing the number of construction joints, modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

E. Measurement of Cement and Aggregate:

1. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment acceptable to the Engineer.

2. Weighing Tolerances:

Material	Percent of Total Weight
Cement	1
Aggregates	3
Admixtures	3

F. Measurement of Water:

1. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the Engineer and capable of measuring the water in variable amounts within a tolerance of one percent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any specified amount of water to each batch of concrete. A positive quick-acting valve shall be used for a cut-off in the water line to the mixer. The operating mechanism must be such that leakage will not occur when the valves are closed.

2.06 READY-MIXED CONCRETE

A. At the Contractor's option, ready-mixed concrete may be used meeting the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94, including the following supplementary requirements.

B. Ready-mixed concrete shall be delivered to the site of the Work, and discharge shall be completed within one and one-half hour (90 minutes) after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first.

C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

E. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the one-quarter (1/4) and three-quarter (3/4) points of the load during discharge give slumps differing by more than one inch (1") when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the Work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

F. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a delivery ticket furnished to the Engineer in accordance with Subsection 03300-1.04B.

G. The use of nonagitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer.

2.07 FLOOR HARDENER (SURFACE APPLIED)

A. Surface hardener shall be a light reflective nonoxidizing metallic aggregate dry shake surface hardener.

1. Surface hardener shall be premeasured, premixed and packaged at the factory.

2. Apply surface hardener at the rate of 1.8 to 2.5 lb per square foot.

3. Surface hardener shall be Alumiplate@, by Master Builders, Inc., or equal.

B. Curing Compound shall meet the moisture retention requirements of ASTM C 309 and surface hardener manufacturer's recommendations.

C. Monomolecular Film: Evaporation retarder shall be used to aid in maintaining concrete moisture during the early placement stages of plastic concrete. Evaporation retarder shall be as recommended by surface hardener manufacturer.

2.08 NSF / ANSI STANDARD 61

A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 PROPORTIONING AND MIXING

A. Proportioning: Proportioning of the concrete mix shall conform to the requirements of Chapter 3, "Proportioning" of ACI 301.

B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of said ACI 301 Specifications.

C. Slump: Maximum slumps shall be as specified herein.

D. Retempering: Retempering of concrete or mortar which has partially hardened shall not be permitted.

3.02 PREPARATION OF SURFACES FOR CONCRETING

A. General: Earth surfaces shall be thoroughly wetted by sprinkling, before the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the Engineer, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. The joint surfaces shall be cleaned of all laitance, loose or defective concrete, foreign material, and roughened to a minimum of ¼ inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting or sandblasting (exposing aggregate) followed by thorough washing. All pools of water shall be removed from the surface of construction joints, and the joint surface shall be coated with an epoxy-bonding agent, unless indicated otherwise, before the new concrete is placed.

C. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent Work; provided that construction joints shall be made only where acceptable to the Engineer.

D. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the Engineer at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with

dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.

E. All inserts or other embedded items shall conform to the requirements herein.

F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where illustrated on the Plans or by approved shop drawings and shall be acceptable to the Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.

G. Casting New Concrete Against Old: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting or sandblasting (exposing aggregate). The joint surface shall be coated with an epoxy bonding agent unless indicated otherwise by the Engineer.

H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. No concrete shall be deposited underwater nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Engineer.

I. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported before placement of concrete that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

J. Openings for pipes, inserts for pipe hangars and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.

K. Anchor bolts shall be accurately set, and shall be maintained in position by templates while embedded in concrete.

L. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.03 HANDLING, TRANSPORTING AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section. No aluminum materials shall be used in conveying any concrete.

B. Nonconforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced at no additional expense to the Owner.

C. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the Engineer. The Contractor shall notify the Engineer in writing at least 48 hours in advance of placement of any concrete.

D. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

E. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the Contractor's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Engineer. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered.

F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slap to the top, for the full width of the placement. As the Work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

G. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90°*F* nor less than 55°*F* for sections less than 12 inches thick nor less than 50°*F* for all other sections. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. When the temperature of the concrete is 85°*F* or above, the time between the introduction of the cement to the aggregates and discharge at the Siteshall not exceed 45 minutes. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90°*F*, the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90°*F*. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.

H. Cold Weather Placement:

1. Placement of concrete shall conform to ACI 306.1 - Standard Specification for Cold Weather Concreting, and the following.

2. Remove all snow, ice and frost from the surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches. All reinforcement and embedded items shall be warmed to above 32°*F* before concrete placement.

3. Maintain the concrete temperature above 50°*F* for at least 3 days after placement.

I. Hot Weather Placement:

1. Placement of concrete shall conform to ACI 305R - Hot Weather Concreting, and the following.

2. Only set retarding admixture shall be used in concrete when air temperature is expected to be consistently over 80°*F*.

3. The maximum temperature of concrete shall not exceed 90°*F* immediately before placement.

4. From the initial placement to the curing state, concrete shall be protected from the adverse effect of high temperature, low humidity, and wind.

3.04 PUMPING OF CONCRETE

A. General: If the pumped concrete does not produce satisfactory end results, discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment: The pumping equipment must have two (2) cylinders and be designed to operate with one (1) cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor shall maintain a standby pump on the site during pumping.

C. The minimum diameter of the hose (conduits) shall be in accordance with ACI 304.2R.

D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.

E. Aluminum conduits for conveying the concrete shall not be permitted.

F. Field Control: Concrete samples for slump, air content, and test cylinders will be taken at the placement (discharge) end of the line.

3.05 ORDER OF PLACING CONCRETE

A. The order of placing concrete in all parts of the Work shall be acceptable to the Engineer. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints. The placing of units shall be accomplished by placing alternate units in a manner such that each unit placed shall have cured at least 7 days for hydraulic structures and 3 days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two (2) adjacent wall panels have cured at least 14 days for hydraulic structures and 7 days for all other structures.

B. The surface of the concrete shall be level whenever a run of concrete is stopped. To ensure a level, straight joint on the exposed surface of walls, a wood strip at least ¾ inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about ½ inch above the underside of the strip. About one (1) hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.

3.06 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be Group 3 (per ACI 309) high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required. Group 2 vibrators may be used only at specific locations when accepted by the Engineer.

B. Care shall be exercised in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.07 FINISHING CONCRETE SURFACES

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown are defined as tolerances and are specified in Part 1, herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Formed Surfaces: No treatment is required after form removal except for curing, repair or defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as specified or as shown.

1. Surface holes larger than ½ inch in diameter or deeper than ¼ inch are defined as surface defects in basins and exposed walls.

C. Unformed Surfaces: After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each Work operation as necessary to prevent drying shrinkage cracks. The classes of finish specified for unformed concrete surfaces are designated and defined as follows:

1. FINISH U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.

2. FINISH U2 - After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where shown or as determined by the Engineer.

3. FINISH U3 - After the floated surface (as specified for Finish U2) has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of all irregularities.

4. FINISH U4 - Steel trowel finish (as specified for Finish U3) without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.

D. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE

Area	Finish
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with grouted tile or topping grout	U2
Slabs which are water bearing with slopes 10 percent and less	U4
Sloping slabs which are water bearing with slopes greater than 10 percent	U4
Slabs not water bearing	U4
Slabs to be covered with built-up roofing	U2
Interior slabs and floors to receive architectural finish	U3
Top surface of walls	U4

E. Floor Hardener (Surface Applied) - Required

1. Provide concrete with the following additional requirements:

a) Maximum slump of 4 inches when peak ambient temperatures are expected to be more than 65°*F*, and no more than 3 inches when ambient temperatures are below 65°*F*.

b) Maximum air content of 3 percent.

c) Do not use calcium chloride or set-accelerating admixtures containing calcium chloride.

d) Do not use admixtures that increase bleeding.

e) Do not use fly ash.

2. After the concrete has been leveled and as soon as the concrete will support an operator and machine without disturbing the level or working up excessive fines, float the surface of the slab with a mechanical float fitted with float shoes. Following floating, apply 1/2 to 2/3 of the total amount of dry shake surface hardener so that a uniform distribution of surface hardener is obtained. The use of a mechanical spreader is recommended. Once the shake has absorbed sufficient moisture (indicated by the darkening of the shake), float the surface. Immediately apply the remaining 1/3 to 1/2 of the shake and allow to absorb moisture. Do not place dry shake on concrete surface when bleed water is present.

3. Use finishing machines with detachable float shoes. Compact surface by a third mechanical floating if time and setting characteristics of the concrete will allow. Do not add water to the surface.

4. As surface further stiffens, indicated by loss of sheen, hand or mechanically trowel with blades set relatively flat. Remove all marks and pinholes in the final raised trowel operation.

5. Follow all application instructions of the floor surface hardener manufacturer.

6. Cure finished floors using fill-forming curing compound recommended by surface hardener manufacturer. Uniformly apply curing compound over the entire surface at a coverage that will provide moisture retention in excess of the requirements of ASTM C 309. Maintain ambient temperature of 50°*F* or above during the curing period.

7. Keep floors covered and free of traffic and loads for a minimum of 14 days after completion.

3.08 ARCHITECTURAL FINISH

A. General: Architectural finishes shall be required only where specifically called out on the Plans. In all other cases, the paragraph above, entitled "Finishing Concrete Surfaces", shall apply.

1. Immediately after the forms have been stripped, the concrete surface shall be inspected and any poor joints, voids, rock pockets, or other defective areas shall be repaired and all form-tie holes filled as indicated herein.

2. Architectural finishes shall not be applied until the concrete surface has been repaired as required and the concrete has cured at least 14 days.

3. All architecturally treated concrete surfaces shall conform to the accepted sample required herein in texture, color, and quality. It shall be the Contractor's responsibility to maintain and protect the concrete finish.

B. Smooth Concrete Finish:

1. The concrete surface shall be wetted, and a grout shall be applied with a brush. The grout shall be prepared by mixing one (1) part Portland Cement and one (1) part of fine sand that will pass a No. 16 sieve with sufficient water to give it the consistency of thick paint. The cement used in said grout shall be 1/2 gray and 1/2 white Portland Cement, as determined by the Engineer. White Portland Cement shall be Atlas White or equal. Calcium chloride in the amount of 5 percent by volume of the cement shall be used in the brush coat. The freshly applied grout shall be vigorously rubbed into the concrete surface with a wood float filling all small air holes. After all surface grout had been removed with a steel trowel, the surface shall be allowed to dry and, when dry, shall be vigorously rubbed with burlap to remove completely all surface grout so that there is no visible paint-like film of grout on the concrete. The entire cleaning operation for any area shall be completed the day it is started, and no grout shall be left on the surface overnight.

2. Cleaning operations for any given day shall be terminated at panel joints. It is essential that the various operations be carefully timed to secure the desired effect which is a light-colored concrete surface of uniform color and texture without any appearance of a point or grout film.

3. In the event that improper manipulation results in an inferior finish, rub such inferior areas with carborundum bricks.

4. Before beginning any of the final treatment on exposed surfaces, treat in a satisfactory manner a trial area of at least 200 square feet in some inconspicuous place selected by the Engineer and preserve said trial area undisturbed until the completion of the job.

C. Sandblasted Concrete Finish:

1. Sandblasting shall be done in a safe manner acceptable to local authorities and per OSHA requirements. The sandblasting shall be a light sandblast to remove laitance and to produce a uniform fine aggregate surface texture with approximately 1/32 to 1/16 inch of surface sandblasted off. Corners, patches, form panel joints, and soft spots shall be sandblasted with care.

2. A 3 square foot sample panel of the sandblasted finish shall be provided by the Contractor for acceptance by the Engineer before staring the sandblasting Work. The sample panel shall include a corner, plugs, and joints and shall be marked after approval. All other sandblasting shall be equal in finish to the sample panel.

3. Protection against sandblasting shall be provided on all surfaces and materials not requiring sandblasting but within or adjacent to areas being sandblasted. After sandblasting, the concrete surfaces shall be washed with clean water and excess sand removed.

3.09 CURING AND DAMP-PROOFING

A. General: All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the Work, and described in detail in the following paragraphs:

Surface To Be Cured or Damp-proofed	Method

Unstripped forms	1
Wall sections with forms removed	6
Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Paragraph	6
Floor slabs on grade	6
Slabs not on grade	6

B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 6, herein.

C. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

E. Method 4: The surface shall be sprayed with a liquid curing compound.

1. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.

2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the new application of additional curing compound over the damaged portion.

3. Wherever curing compound may have been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by wet sandblasting just before the placing of new concrete.

4. Where curing compound is specified, it shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has

been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as specified herein.

5. At all locations where concrete is placed adjacent to a panel which has been coated with curing compound, the previously coated panel shall have curing compound reapplied to an area within 6 feet of the joint and to any other location where the curing membrane has been disturbed.

6. Before final acceptance of the Work, all visible traces of curing compound shall be removed from all surfaces in such a manner that does not damage surface finish.

F. Method 5:

1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. The concrete shall be given a coat of curing compound in accordance with Method 4, herein. Not less than 1 hour nor more than 4 hours after the coat of curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2 inch wide strips of sealing tape or with edges lapped not less than 3 inches and fastened together with a waterproof cement to form a continuous watertight joint.

2. The curing blankets shall be left in place during the 14 day curing period and shall not be removed until after concrete for adjacent Work has been placed. Should the curing blankets become torn or otherwise ineffective, replace damaged sections. During the first 3 days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8 inch minimum thickness, laid over the curing blanket. Add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.

G. Method 6: This method applies to both walls and slabs.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 14 consecutive days, beginning immediately after the concrete has reached final set or forms have been removed or until the concrete surface is covered with the curing medium. The entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed.

2. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held in place to prevent being dislodged by wind or any other causes and to be substantially in contact with the concrete surface. All edges shall be continuously held in place.

3. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours. The

concrete shall be maintained in a cool condition from the heat of hydration and the solar heat of the sun.

4. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, any dry spots shall be rewetted, and curing compound shall be immediately applied in accordance with Method 4, herein.

5. Dispose of excess water from the curing operation to avoid damage to the Work.

H. Damp-proofing: The exterior surface of all buried roof slabs shall be damp-proofed as follows:

1. Immediately after completion of curing the surface shall be sprayed with a damp-proofing agent consisting of an asphalt emulsion. Application shall be in two (2) coats. The first coat shall be diluted to 1/2 strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the specified material, undiluted, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Damp-proofing material shall be as specified herein.

2. As soon as the asphalt emulsion, applied as specified herein, has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used which produces a uniformly coated white surface and which so remains until placing of the backfill. Should the whitewash fail to remain on the surface until the backfill is placed, apply additional whitewash.

3.10 PROTECTION

A. Protect all concrete against injury until final acceptance by the Owner.

B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. Provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

3.11 CURING IN COLD WEATHER

A. Water curing of concrete may be reduced to 6 days during periods when the mean daily temperature in the vicinity of the worksite is less than 40°*F*; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.

B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50°*F* for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50°*F*. Concrete cured by water curing shall be protected against freezing temperatures for 3 days immediately following the 72 hours of protection at 50°*F*.

C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40°*F* in 24 hours. In the spring, when the mean daily temperature rises above 40°*F* for more than 3 successive days, the specified 72 hour protection at a temperature not lower than 50°*F*

may be discontinued for as long as the mean daily temperature remains above 40°*F;* provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

D. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these Specifications.

3.12 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.

B. Defective surfaces to be repaired shall be cut back from trueline in a minimum depth of ½ inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair proposed shall consist of a mixture of 1 sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas White Portland Cement as is required to make the color of the patch match the color of the surrounding concrete.

C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

D. All repairs shall be built up and shaped in such a manner that the completed Work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

E. Before filling any structure with water, all cracks that may have developed shall be “vee’d” and filled with construction joint sealant for water-bearing structures conforming to the materials and methods specified in Section 03290 - Joints in Concrete Structures. This repair method shall be accomplished on the water bearing face of members. Before backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.

3.13 PATCHING HOLES IN CONCRETE

A. Patching Small Holes:

1. Holes which are less than 12 inches in their least dimension and extend completely through concrete members, shall be filled as specified herein.

2. Small holes in members which are water-bearing or in contact with soil or other fill materials, shall be filled with nonshrink grout. Where a face of the member is exposed to view, the nonshrink grout shall be held back 2 inches from the finished surface. The remaining 2 inches shall then be patched according to the paragraph in Part 3 entitled - Treatment of Surface Defects.

3. Small holes through all other concrete members shall be filled with nonshrink grout, with exposed faces treated as above.

B. Patching Large Holes:

1. Holes which are larger than 12 inches in their least dimension, shall have a keyway chipped into the edge of the opening all around, unless a formed keyway exists. The holes shall then be filled with concrete as specified.

2. Holes which are larger than 24 inches in their least dimension and which do not have reinforcing steel extending from the existing concrete, shall have reinforcing steel set in grout in drilled holes. The reinforcing added shall match the reinforcing in the existing wall unless required otherwise by the Improvement Plans or approved shop drawings.

3. Large holes in members which are water bearing or in contact with soil or other fill, shall have a bentonite type waterstop material placed around the perimeter of the hole as specified in the Section 03290 - Joints in Concrete Structures, unless there is an existing waterstop in place.

3.14 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time before the final acceptance of the completed Work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

END OF SECTION

SECTION 03345 - CONCRETE FINISHING

PART 1 -- GENERAL

1.01 DESCRIPTION

Work included: Provide finishes on cast-in-place concrete as called for on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen 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.

B. Except as may be modified herein or otherwise directed by the Architect, comply with ACI 301, "Specifications for Structural Concrete for Buildings".

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product data, submit:

1. Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.05 PRODUCT HANDLING

Comply with pertinent provisions of Division 1.

1.06 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Not required

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

None required.

E. Extended Warranty:

Comply with the requirements of General Condition Article 6 and Section 01700.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. General:

1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.

2. As required for the Work, provide the following materials, or equals accepted in advance by the Architect.

B. Liquid bonding agent: "Weld-Crete," manufactured by the Larsen Products Corporation.

C. Curing and protection paper:

1. Comply with ASTM C171, Type 1, regular.

2. Accepted products:

a) "Sisalkraft, Seekure 896";

b) Equal non-staining products faced with polyethylene film.

D. Slip-resistant abrasive aggregate:

1. Provide aluminum oxide grains, uniformly graded, screen size 12-13, 14-36 or 16-30.

2. Acceptable product:

a) Emerchrome Floor Hardener by L.M. Scofield Company.

b) Frictex H by Sonneborn.

c) or approved equal.

2.02 OTHER MATERIALS

Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 FINISHING OF FORMED SURFACES

A. General:

1. After removal of forms, give exposed concrete surfaces the finish specified below.

2. Revise the finish as needed to secure the acceptance of the Architect.

B. Rubbed finish:

1. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.

2. Do not permit cleaning as the work progresses.

3. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.

4. Substitute white portland cement for part of the gray portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.

5. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, and apply the grout uniformly with brushes or spray gun.

6. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.

7. While the grout is still plastic, remove all excess grout by working the surfaces with a rubber float, sack, or other means.

8. After the surface whites from drying (above 30 minutes at normal temperatures), rub vigorously with clean burlap.

9. Keep the surface damp for at least 36 hours after final rubbing.

3.03 FINISHING SLABS

A. Definition of finishing tolerances:

1. "Class A": True plane within 1/8" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

2. "Class B": True plane within 1/4" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

B. Scratched finish: For surfaces scheduled to receive bond-applied cementitious applications.

1. After the concrete has been placed, consolidated, struck off, and leveled to a Class B tolerance, roughen the surface with stiff brushes or rakes before the final set.

C. Floated finish: For surfaces intended to receive roofing.

1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.

2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.

3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.

4. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.

5. Refloat the slab immediately to a uniform sandy texture.

D. Troweled finish:

1 Provide a floated finish as described above, followed by a power troweling and then a hand troweling which is relatively free from defects, but which still may show some trowel marks.

a. Monolithic Trowel Finish: For all floor surfaces not otherwise specified. Steel trowel and retrowel to smooth surface. After concrete has set enough to ring true, retrowel to a burnished impervious finish, free of trowel marks or other blemishes.

b. Steel Float Finish: for all slabs to receive resilient tile, waterproof membrane, or carpeting. Same as monolithic finish except omit burnish retroweling.

c. Fine Swirl Finish (when shown on the Drawings): Prepare same as steel float finish. When ready, perform such finishing operations as necessary to produce Architect-selected fine textured, non-slip finish. Construct sample panel for Architect's acceptance prior to placement. Sample panel shall consist of tooled edges and have a tooled joint within field of panel.

2 Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance.

E. Broom finish: For slabs to receive thin set tiles, apply steel float finish followed by very fine broom finish. For surfaces to receive mortar setting beds and for exterior concrete driveway ramps, curbs and gutters, spandrels, etc.

1. Provide a finished surface uniform in texture and appearance, and in a plane of Class A tolerance. Roughen surface with coarse broom.

F. Rock Salt finish: Exterior walkways and pavings except where non-slip finish is specified.

1. Provide a floated finish as described above.

2. While the surface is still plastic, broadcast rock salt into the surface and embed uniformly into the surface by light tamping.

3. Float the surface until it has been brought to a true plane with Class B tolerance.

4. After the concrete has completely set, flood the surface with water to dissolve the rock salt, using a fine bristle brush as necessary to remove the salt.

5. Provide a sample panel at the site of the proposed finish and receive the acceptance of the Architect of that finish prior to placing of the paving.

G. Non-slip finish: For exterior platforms, steps, and landings; and Interior and exterior pedestrian ramps.

1. Provide a floated finish as described above.

2. While the surface is still plastic, broadcast abrasive aggregate as specified in Paragraph 2.01.F above and work into the surface according to the manufacturer's recommendations.

3. Complete finishing surface as described above for a troweled finish, and as recommended by the aggregate manufacturer.

3.04 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.

B. Preservation of moisture:

1. Unless otherwise directed by the Architect, apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing.

a. Ponding or continuous sprinkling;

b. Application of absorptive mats or fabric kept continuously wet;

c. Application of sand kept continuously wet;

d. Continuous application of team (not exceeding 150° F) or mist spray;

e. Application of waterproof sheet materials specified in Part 2 of this Section;

f. Application of other moisture-retaining covering as accepted by the Architect.

g. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.

2. Cure concrete by preserving moisture as specified above for at least ten days.

C. Temperature, wind, and humidity:

1. Cold weather:

a) When the mean daily temperature outdoors is less than 40° F, maintain the temperature of the concrete between 50° F and 70° F for the required curing period.

b) When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.

c) Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

2. Hot weather: When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.

3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5° F in any one hour period, or 50° F in any 24 hour period.

D. Protection from mechanical injury:

During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.

1. Protect finished concrete surfaces from damage from construction equipment, materials, and methods, by application of curing procedures, and by rain and running water.

2. Do not load self-supporting structures in such a way as to over stress the concrete.

END OF SECTION

SECTION 05120- STRUCTURAL STEEL

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide structural steel beams, columns, bracings, galvanizing, and appurtenances, complete, in accordance with the Contract Documents.

1.02 RELATED SECTIONS

A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.

B. Related Work Specified in Other Sections:

1. Section 03200 - Reinforcement Steel.

2. Steel supports, hangars, brackets and other miscellaneous items accessory to the mechanical and electrical installations.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

B. Commercial Standards (Current Edition):

1.	AISC M 011	Manual of Steel Construction for Shop and Field Welding.
2.	AISC S 326	Design, Fabrication and Erection of Structural Steel for Buildings.
3.	AWS B 3.0	Welding Procedures and Performance Qualifications.
4.	AWS D 1.1	Structural Welding Code - Steel.
5.	AWS W 1	Welding Metallurgy

C. ASTM Standards in Building Code (Current Edition):

1.	ASTM A 6	General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
2.	ASTM A 36	Structural Steel (Except “W” rolled shapes)
3.	ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
4.	ASTM A 325	High Strength Bolts for Structural Steel Joints
5.	ASTM A 490	Heat-Treated Structural Steel Bolts
6.	ASTM A 992	High Strength Structural Steel (“W” rolled shapes)

7. ASTM A 500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish submittals to the Engineer for review in accordance with the Specification Section 01300 – Contractor Submittals.

B. Shop Drawings and Erection Drawings: The shop drawings shall provide a materials and specification list, construction and fabrication details, layout and erect diagrams, and the method of anchorage to adjacent construction. The shop drawings shall give the location, type, size and extent of welding and bolted connections, and clearly distinguish between shop and field connections. Before submittal of the shop drawings, the Contractor shall coordinate the shop drawings and related trades to ensure proper mating of assemblies. All work shall conform to the approved shop drawings.

C. Test Reports: The Contractor shall furnish certified physical and chemical mill test reports for material used for structural members. All tests shall be performed in accordance with applicable ASTM Standards.

1.05 DELIVERY

A. The Fabricator shall deliver the fabricated material to the job site in the sequence as approved by the Engineer.

B. All shipped material to be piece-marked for erection with metal tags or other appropriate method approved by the Engineer.

C. All material shipments shall include sufficient bolts for erection, plus at least the following extra bolts:

1. Add a minimum of 5% for unfinished bolts.

D. The Engineer reserves the right to inspect fabricated material at Fabricator's shop. The Engineer's expenses for shop inspections shall be borne by the Contractor. In the event the Engineer identifies faulty materials or workmanship in fabricated material at the Fabricator's shop, the materials shall be re-fabricated at no cost to the Owner. The Engineer shall be notified at least 7 days before the shipment of material. Shipments of material shall not be delayed if the Engineer does not require inspection.

E. Material damaged in shipment shall be replaced or repaired at the Contractor's expense at no additional cost to the Owner.

1.06 QUALITY ASSURANCE

A. The Contractor shall fabricate and erect structural steel work in accordance with the latest edition of AISC "Specification for the Design, Fabrication and Erection of Steel for Buildings", and "Code of Standard Practice for Steel Buildings and Bridges", except whenever there is a discrepancy between the Plans and this Section, the Plans will govern.

B. Continuous Inspections:

1. The Contractor shall perform all welding and high strength bolting of structural steel assemblies under continuous inspection of the Engineer. Should such fabrication be performed in the shop of a licensed Fabricator approved by the Engineer, only the field welding and high strength bolting of structural steel assemblies will be required to be performed under continuous inspection of the Engineer.

2. The Contractor shall notify the Engineer at least 48 hours in advance of the needed inspection.

3. The Contractor shall provide copies of inspection reports to the Engineer and Building Department, if applicable.

1.07 WARRANTY

A. The Fabricator shall furnish a warranty to the Owner to replace or repair all defective material and workmanship within 18 months of shipment, or 12 months of plant startup, whichever occurs first, excluding defects due to normal usage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: All materials shall be new, sound and conform to the requirements herein. Unless otherwise indicated, structural steel shall be coated per Technical Specification - Division 9 requirements.

B. Structural Steel: Rolled shapes, plates and bars shall conform to the latest edition of the AISC "Manual of Steel Construction", and shall also conform to current ASTM Designation A 36. All "W" rolled shapes shall conform to A 992.

C. Pipe: Pipe shall conform to ASTM A 53, Grade B seamless galvanized as required, Schedule 40, except as otherwise shown on the Plans.

D. Tubes: Tubes shall conform to ASTM A 500 Grade B.

E. Welding Electrodes: The Contractor shall use steel electrodes conforming with AWS D 1.1, except that E7024 rods or electrodes shall not be used.

2.02 FABRICATION

A. Fabrication shall be in accordance with AISC S 326 and indicated requirements. All structural steel welding in off-site fabrication shops shall be continuously inspected by the Engineer with the inspection cost of the Engineer to be borne by the Contractor. The continuous inspection will be waived if the work is done in a shop certified by the Council of American Building Officials (CABO), or listed by the International Conference of Building Officials (ICBO) Evaluation Services, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Structural assemblies and shop and field welding shall meet the requirements of AISC M 011 and AISC S 326.

2. Measurements and dimensions shall be verified by the Contractor at the site.

3. Bolt holes shall be 1/16 inch larger than the nominal size of bolts. Where thick metals are indicated, holes shall be sub-punched and drilled, or reamed.

4. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators.

5. Bolts shall not be permitted to drift, and holes shall not be enlarged to correct misalignment. In the event of mismatching of holes, new materials shall be provided.

6. Structural steel completely encased in concrete shall not be galvanized or painted, and shall have a clean surface for bonding to concrete.

7. Damaged structural steel shall be replaced. Use of salvaged, reprocessed, or scrap materials shall not be permitted.

B. Welding: Welding shall be performed by operators who have been qualified by tests as prescribed by AWS-W1 Section 7, to perform the type of welding indicated. Welding shall comply with AWS Code for Arc Welding in Building Construction, Section 4, Workmanship. Electrodes shall be matching per AWS.

C. Coating: The Contractor shall coat structural steel in accordance with Technical Specification - Division 9 requirements.

3.02 INSPECTION

A. The Engineer reserves the right to inspect all materials and workmanship covered in this Specification. However, such inspection shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the Contract requirements. If inspection indicates a weld or part of the material is defective, the Contractor shall remove and replace it at the Contractor's expense.

B. Shop inspection may include, but not be limited to, the following:

1. Verification of conformance of materials with this Specification and the Plans. The limits of acceptability and repair of surface imperfections for structural steel shall be in accordance with ASTM A 6.

2. Visual and dimensional inspection of shop-fabricated structural steel members and assemblies shall be in conformance with this Specification and the Plans.

3. Verification of welding procedures, welding operations and welder and tacker certificates of qualification shall be in accordance with this Specification and AWS D 1.1.

END OF SECTION

SECTION 05220 - CONCRETE BOLTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide concrete anchor bolts, inserts, complete, in accordance with the Contract Documents. Principal items are anchor bolts placed in concrete, adhesive anchors, expansion bolts, and drilled anchors.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).

C. Federal Specifications:

1. MIL-A-907E — Antiseize Thread Compound, High Temperature

D. Commercial Standards (Current Edition):

1. American Welding Society AWS A 5 Series.
2. ANSI/AWS B 3.0 — Welding Procedure and Performance Qualifications
3. ANSI/AWS D 1.1 — Specification for Welding Code - Steel
4. ANSI/AWS D 1.3 — Specification for Welding Sheet Steel in Structure
5. AISC — American Institute of Steel Construction - Manual of Steel Construction

E. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 36 — Specification for Structural Steel
2. ASTM A 123 — Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
3. ASTM A 153 — Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
4. ASTM A 193 — Specifications for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service
5. ASTM A 194 — Specifications for Carbon and Alloy Steel Nuts for Bolts and High Pressure and High Temperature Service
6. ASTM A 307 — Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile

7. ASTM A 320 Specification for Alloy Steel Bolting Materials for Low-Temperature Service

8. ASTM A 563 Specification for Carbon and Alloy Steel Nuts

1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings: Shop drawings of all concrete bolts shall be submitted to the Engineer for review in accordance with the Specification Section 01300 – Contractor Submittals.

B. An International Conference of Building Officials (ICBO) report listing the ultimate load capacity in tension and shear for each size and type of adhesive and expansion concrete anchor used shall be submitted for review. The Contractor shall submit manufacturer's recommended installation instructions and procedures for all adhesive and expansion anchors for review and approval. The Contractor shall follow approved procedures during installation of concrete anchors.

C. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICBO report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75°*F*.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Anchor Bolts: Anchor bolts shall be fabricated of materials complying with SSPWC Subsections 206-1.4.1 and 209-2.2, and as follows:

1. Steel bolts: ASTM A 307 Grade A.

2. Fabricated steel bolts: ASTM A 36.

3. Stainless steel bolts, nuts, washers: ASTM A 320, Type 316.

B. Standard Service Bolts (not Buried or Submerged): Except where otherwise indicated, all bolts, anchor bolts, and nuts shall be steel, galvanized after fabrication as indicated herein unless the bolts are for pipe fittings, transition couplings, mechanical restrained joint fittings, flanged coupling adapters or other piping or piping fittings. The bolts and hardware for these items are specified in Section 02650. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, steel for bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A 307, Grade A or B, or threaded parts of ASTM A 36.

C. Buried or Submerged Bolts: Unless other corrosion-resistant bolts are indicated, all bolts, anchor bolts, nuts and washers which are buried, submerged, or below the top of the wall inside any hydraulic structure shall be Type 316 stainless steel conforming to ASTM A 193 for bolts, and to ASTM A 194 for nuts, unless the bolts are for pipe fittings, transition couplings, mechanical restrained joint fittings, flanged coupling adapters or other piping or piping fittings. The bolts and hardware for these items are specified in Section 02650. All threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E.

1, Antiseize lubricant shall be classified as acceptable for potable water use.

2. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL, 60131; AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or equal.

D. Bolt Requirements:

1, The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads, and nuts shall be Heavy Hexagon Series.

3. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case, more than ½ inch beyond the nut.

E. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.

1, Epoxy adhesive anchors are required for drilled anchors where exposed to weather, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails, pumps, mechanical equipment, and reinforcing bars. Epoxy anchor grout shall comply with Section 03315 - Grout. Threaded rod shall be stainless steel Type 316.

2. Unless otherwise indicated, glass capsule, polyester resin adhesive anchors will be permitted in locations not indicated above, and shall be Hilti HVA, or equal. Threaded rod shall be galvanized steel.

F. Expanding-Type Anchors: Expanding-type anchors, if indicated or permitted, shall be steel expansion-type ITW Ramset/Redhead "Trubolt" anchors; McCullock Industries "Kwick-Bolt"; or equal. Lead caulking anchors will not be permitted. Size shall be as indicated. Expansion-type anchors, which are to be embedded in grout, may be steel. Nonembedded buried, or submerged anchors shall be stainless steel.

G. Powder-Driven Pins: Powder-driven pins for installation in concrete shall be heat-treated steel alloy. If the pins are not inherently sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded-heads capable of transmitting the loads the shanks are required to support.

H. Impact Anchor: Impact anchors shall be an expansion-type anchor in which a nail-type pin is driven to produce the expansive force. It shall have a zinc sleeve with a mushroom-style head and stainless steel nail pin. Anchors shall be Metal Hit Anchors, manufactured by Hilti, Inc.; Rawl Zamac Nailin, manufactured by the Rawlplug Company, or equal.

2.02 GALVANIZING

A. Iron and Steel: ASTM A 123, with average weight per square foot of 2.0 ounces, and not less than 1.8 ounces per square foot.

B. Ferrous Metal Hardware Items: ASTM A 153 with average coating weight of 1.3 ounces per square foot.

C. Touch-Up Material For Galvanized Coatings: Repair galvanized coatings marred or damaged during erection or fabrication by use of DRYGALV, as manufactured by the American Solder and Flux Company, Galvalloy, Galvion, Rust-Oleum 7085 Cold Galvanizing Compound, or equal, applied in accordance with the manufacturer's instructions.

2.03 WELDING ELECTRODES

A. Steel Electrodes: Use welding electrodes conforming with AWS D 1.1, except E7024 rods or electrodes shall not be used.

B. Aluminum Electrodes: Contingent upon alloys being welded, use only inert gas-shielded arc or resistant-welding process with filler alloys conforming to UBC Standard No. 28, Table 28-1-C. Use no process requiring a welding flux.

C. Stainless Steel Electrodes: Perform welding of stainless steel with electrodes and techniques as contained in pertinent AWS A5 series specification, and as recommended in Welded Austenitic Chromium-Nickel Stainless Steel Techniques and Properties as published by the International Nickel Company, Inc., New York, New York.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Installation: Except as otherwise indicated, the fabrication and installation of anchor bolts shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction".

B. Install adhesive expansion and drilled anchor bolts in accordance with method specified in ICBO for manufacturer product.

C. Powder-Driven Pins: Powder-driven pins shall be installed by a craftsman who is certified by the manufacturer as being qualified to install the manufacturer's pins. Pins shall be driven in one initial movement by an instantaneous force that has been carefully selected to attain the required penetration. Driven pins shall conform to the following requirements where "D" = Pin's shank diameter:

Material Penetrated by Pin	Material's Minimum Thickness	Pin's Shank Penetration in Supporting Material	Minimum Space From Pin's CL to Edge of Penetrated Material	Minimum Pin Spacing
Concrete	16D	6D minimum	14D	20D

3.02 WELDING

A. Perform all welding in accordance with the "Structural Welding Code-Steel", AWS D 1.1, and current revisions. Use only welders qualified by tests in accordance with AWS B 3.0.

3.03 GALVANIZING

A. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153. Field repairs to galvanizing shall be made using "Galvinox", "Galvo-Weld", or equal.

3.04 INSPECTION

A. The Engineer reserves the right to inspect all materials and workmanship covered in this Section. Such inspections will not relieve the Contractor's responsibility to furnish materials and workmanship in accordance with the Specifications. If inspections indicate that materials or workmanship are defective, the Contractor shall remove and replace the defective work at no additional cost to the Owner.

END OF SECTION

SECTION 05400 – LIGHT METAL FRAMING

PART 1 - GENERAL

1.01 THE REQUIREMENT:

A. The Contractor shall furnish and construct all light metal framing and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Miscellaneous Metalwork – Section 05500

B. Gypsum Board – Section 09250

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS:

A. Codes:

The Building Code, as referenced herein, shall be the Uniform Building Code (UBC), as specified in Section 01090 entitled, "Reference Standards".

B. Commercial Standards:

ANSI/ASTM A 446/5/446M-83	Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
ASTM A 570-84a	Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
ASTM C 645	Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.
Metal Lath Association	Specifications for Metal Lathing and Furring.
Gypsum Association	Specifications for Installation of Screw-Type Steel Framing Member to Receive Gypsum Board, GA-203.

PART 2 - PRODUCTS

2.01 METAL STUDS:

A. Non-Load Bearing: Metal studs shall be of the non-load-bearing channel type, roll-formed from 18-gage and 20-gage electro-galvanized steel. Tracks and erection accessories shall be standard products of an established metal stud manufacturer unless otherwise specified or shown. Metal studs depth shall be 3-5/8 inch deep unless otherwise shown on the Drawings.

B. Height Limits and Schedule: Maximum height limits for non-load-bearing studs shall be as follows, unless otherwise shown:

Gage	Stud Schedule Spacing Ctr. to Ctr. (Inches)	2-1/2 Inch
20	12	24-ft. 10-in.
20	16	23-ft. 7-in.
20	24	20-ft. 8-in.

C. 18-gage studs shall be used at non-load bearing walls having a lath and plaster condition.

2.02 MISCELLANEOUS MATERIALS:

A. Hanger Wire: Hanger wire for suspended gypsum board ceilings shall be of soft-temper, annealed and galvanized steel wire. Hanger wire size shall be not less than that required by governing code.

B. Runner Channels: Runner channels shall be 1-1/2 inch cold-rolled channels and 3/4-inch stiffener channels, galvanized or factory-coated with rust-inhibitive paint. Channels shall have minimum weight of 475 and 300 lbs./1000 L.F., respectively.

C. Furring Channels: Furring channels shall be designed for screw attachment of 5/8-inch gypsum wallboard. They shall be roll-formed, galvanized Grade "A" steel conforming to ANSI/ASTM A 446, with a metal thickness of 0.035-inch minimum, 7/8-inch depth and 1-3/8 inch web.

D. Tie Wire: Tie wire shall be galvanized, 16-gage, annealed steel wire.

E. Fasteners: Fasteners shall be as required and as recommended within the Reference Standards.

F. Welding Materials: Welding materials shall be as recommended in the published standards of the structural stud manufacturer.

G. Power-Driven Pins: Power-driven pins to be installed in concrete or steel shall be of heat-treated steel alloy. If the pins are not sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded heads capable of transmitting the loads the shanks are required to support. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank. Complete information describing pin capacity, connections and proposed area of use shall be submitted to the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS:

A. All work shall be installed in conformance with the manufacturer's recommendations and per the applicable requirements of UBC, ANSI and other referenced standards as specified or shown.

3.02 CEILING SUSPENSION SYSTEM:

A. Components: All necessary items for a complete installation shall be provided, including devices for attachment to overhead construction, hanger wires, main runners, splines, splicers, connecting clips, wall connectors, hold-down clips, edge moldings and other appurtenances.

B. Hanger Wires: Hanger wires shall be spaced along the main runner so that each hanger supports a minimum area of 16 square feet.

C. Runner Channels: Main runners shall be ½-inch channels spaced at 4-feet on centers. Hanger wires shall be saddle-tied along runners. Cross furring channels shall be spaced at 16-inches on centers, maximum, and shall be saddle-tied to main runner channel.

D. Interruptions: At any openings that interrupt the continuity of furring channels, additional cross reinforcing shall be provided to restore lateral stability or grillage.

3.03 METAL STUDS, FURRING AND FRAMING (For Non-Bearing Walls):

A. Runner Track Attachment: Floor and ceiling runner tracks shall be securely fastened to floor (or floor plate if required) and overhead construction as shown and as required.

B. Stud Attachment: Studs shall be securely fastened to tracks and spaced in accordance with the stud schedule. Each stud shall be crimped into runner tracks at the top, bottom and both sides for friction fit ¼-inch deflection clearance on top.

C. Wall Stiffening: Walls shall be stiffened with ¾-inch channels placed horizontally at not more than 4-1/2 foot vertical spacing.

D. Stud Requirements: Metal stud installation shall conform to the following requirements:

1. Studs shall be located at all door jambs, at abutting construction, intersecting walls and corners. Each corner and intersection of walls and partitions shall be formed with not less than three (3) studs.

2. Double 20-gage studs shall be installed at all door jamb and header locations as shown on the Drawings and shall be secured to the jamb anchors of each door frame by bolt or screw attachment.

3. Studs extending from door frame header to ceiling runner over door frames shall be positioned at wall board joints. Stud walls which do not extend to the structures above the ceiling shall be braced to the structure at every 6-feet and at door jamb locations.

4. The Contractor shall install 20-gage studs at wall-mounted fixtures and at a maximum of 12-inches on centers at walls having a lath and plaster condition or receiving ceramic tile.

5. Stud walls shall be braced as necessary to provide rigid construction. Double row of studs for chase walls shall be braced with cross ties of 5/8-inch thick gypsum board, 12-inches wide, installed at quarter points of studs.

6. Parapet walls and hung exterior walls and soffits shall be framed as shown with not less than 18-gage studs.

7. Double 20-gage studs shall be installed at all window jamb, sills and headers as shown on the Drawings.

E. Openings: Openings shall conform to the following requirements:

1. Channels shall be provided around openings for attachment of metal frames, dampers, grilles and ductwork in connection with metal studs and shall be securely fastened to studs.

2. Headers, sills and jack studs shall be provided as required at openings. Headers shall overlap adjacent vertical studs and shall be securely screw-attached to adjacent studs.

3. A 1-1/2 inch channel stiffener shall be installed 6-inches above all door openings. Stiffeners shall extend past the second single stud on each side of the opening and shall be saddle-tied to the structure.

F. Lintels: Trussed or box-framed lintel members designed to resist applied loads without excessive deflection shall be provided and shall be secured together by screws or other approved means.

G. Support for Wall-Mounted Items: Solid blocking, 1-1/2 inch channels, horizontal studding or other members within walls shall be provided as required and/or shown to provide secure and adjacent support for wall-mounted or wall-braced items. Galvanized plates shall be provide as backing for handrail brackets, 16-gage by 8-inch by 16-inch.

H. Horizontal Stiffeners: Ends of horizontal stiffeners shall be securely fastened to abutting construction.

I. Furring Channels: Furring channels shall be spaced 16-inches on centers, maximum, unless shown otherwise. Spans shall not exceed manufacturer's published recommendations and governing code requirements.

3.04 WORKMANSHIP:

A. Alignment: All metal studs shall be installed rigid, in line, level and plumb and shall be suitable for the application of the intended succeeding contiguous materials. The maximum allowable deviation in any plane shall be 1/8-inch from an 8-foot straight line and ¼-inch maximum in a surface having a total length in excess of 8-feet.

B. Component Fit: All framing members and tracks shall meet the following requirements:

1. All framing components shall be cut squarely or on an angle, as in bracing, to fit squarely against abutting members.

2. Tracks shall be securely anchored to the floor and overhead structure or other members.

3. Studs shall be seated squarely in the track with the stud web and flanges abutting the track web, shall be plumbed, aligned and shall be adequately attached to the flanges or web of both the upper and lower tracks.

END OF SECTION

SECTION 05521 - ALUMINUM RAILINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish and install all aluminum railings complete and in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300 - Cast-in-Place Concrete

B. Section 05500 - Miscellaneous Metalwork

C. Section 09800 - Protective Coatings

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Codes:

The Building Code, as referenced herein, shall be the Uniform Building Code (UBC), as specified in Section 01090 - Reference Standards

B. Commercial Standards:

Aluminum Association (AA) publications as cited herein.

1.04 CONTRACTOR SUBMITTALS

A. The railing manufacturer's shop drawings, technical data and engineering calculations shall be submitted for review in accordance with Section 01300 - Contractor Submittals. Engineering calculations shall include, but not be limited to, railings, brackets, support flanges and fasteners or anchors.

PART 2 - PRODUCTS

2.01 SUPPLIERS

A. Pipe railings and pipe handrails shall be "Reyno-Rail II" as manufactured by Reynolds Aluminum Co.; "C-V Pipe Rail" as manufactured by CraneVeyor Corp., South El Monte, California; "ConnectorRail" as manufactured by Julius Blum & Co.; or equal.

2.02 STRUCTURAL PERFORMANCE OF RAILING COMPONENTS

A. Railings and handrail brackets shall be capable of withstanding either of the following loading conditions without exceeding the allowable working stress of the material and without permanent deformation:

1. A 200 lb. concentrated load applied to any point in any direction.

2. A 50 lb. per linear foot loading applied perpendicular to the top rail.

2.03 MATERIALS

A. Rail, Post and Toeboard Materials: Railings and handrails shall be round pipe design railing system unless specified or shown otherwise. Aluminum shall be U.S. Alloy 6061 or 6063, T-5 or T-6. Aluminum pipe rail and posts shall be not less than 1-1/2 inch diameter, Schedule 40 pipe.

B. Welding Rods: Aluminum welding rods shall be of type recommended by the aluminum manufacturer for anodized finished products.

C. Fasteners: Fasteners, screws and bolts shall be concealed and shall be of stainless steel or aluminum. Handrail bracket fasteners and fasteners over water basins shall be of stainless steel.

D. Support Brackets: Handrail support brackets shall be aluminum with a finish that matches the handrail or railing of which they are a part.

E. Toeboards: Toeboard for pipe railing shall be as shown on the Plans.

F. Socket Grout: Non-shrink grout for handrail post sockets shall consist of an inorganic, non-metallic, pre-mixed grout with a minimum 28 day compressive strength of 4,000 PSI.

2.04 FINISHES

A. Pipe Railing System: Pipe railing system including posts, railings, tube caps, support brackets and other miscellaneous parts shall be provided with a 0.7 mil clear anodized finish, AA-M32 C22A41.

2.05 ASSEMBLIES

A. Height and Spacing Requirements: Railing shall be a two (2) rail system with equal open spaces between rails (and toeboard when required). Whenever the UBC requirements are not specified and only California OSHA requirements are specified the open spaces between rails need only conform to California OSHA requirements and may be spaced 21 inches apart. Top of upper railing shall be 42 inches above the working surface. Toeboards shall be not less than 4 inches in height nor more than ¼ inch off the working surface and shall be provided where indicated and/or required. Railings shall be mounted as shown on the Drawings. The posts shall be evenly spaced at not less than 4 feet nor more than 6-feet on centers. Field conditions may require some adjustment of spacing. The top railings shall be as long as possible and the post shall not project through the top rails.

PART 3 - EXECUTION

3.01 GENERAL

A. Unless specified or shown otherwise, all handrails and railings shall be component systems, installed complete and ready for use with all anchors, attachments, balusters, brackets, caps, fasteners, gates, posts, sleeves, trim and all other related items required or necessary for the complete installation.

B. All installation work hereunder shall be performed by craftsmen experienced in the fabrication or architectural metal work. Exposed surfaces shall be free from defects or other surface blemishes. All dimensions and conditions shall be verified in the field in advance. All joints, junctions, miters and butting sections shall be precision-fitted with no gaps occurring between sections and all surfaces shall be flush and aligned.

3.02 WELD FINISH

A. All exposed welds shall be ground smooth and flush and shall be polished and anodized. Discoloration of exposed aluminum surfaces, whether or not due to welding, shall constitute a basis for rejection of the entire assembly.

3.03 EXPANSION/CONTRACTION

A. Exterior railing systems shall provide for ¼ inch expansion and contraction per 20 linear feet of railing. Interior railing systems shall provide for 1/8 inch expansion or contraction per 20 linear feet of railing.

3.04 RAILING CONTINUITY AND END TREATMENT

A. Handrails and railings shall be designed to form a continuous run system with elbow turns and bends that do not have interferences with hand movement. Handrails shall be continuous for the full length of the stairs and landings. The handrails shall extend not less than 6-inches beyond the top and bottom risers. Whenever possible, the extension shall be at least 18 inches for the possible use by handicapped persons. The ends of handrails shall be returned to wall or shall be terminated in newel posts or safety terminals. Newel posts and safety terminals may be used only when approved by the Engineer.

3.05 INSTALLATIONS WITH DISSIMILAR MATERIALS IN CONTACT WITH ALUMINUM

A. Special care shall be exercised to prevent aluminum components from coming in contact with steel, galvanized steel and concrete or dissimilar metals or materials. See Section 3.05B above. Only stainless steel bolts or components shall be used to connect isolated dissimilar materials.

END OF SECTION 05521

SECTION 05600 - PRE-ENGINEERED METAL BUILDING

PART 1 - GENERAL

1.01 DESCRIPTION

The Contractor shall furnish and erect a pre-engineered metal building and associated accessories complete and in accordance with the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. AISI - Specification for the Design of Cold-Formed Steel Structural Members - 2002 Edition with 1989 Addendum.

B. AISC - Specification for Structural Steel Buildings - 2005.

C. AISC - Steel Design Guide Series 3 - Serviceability Design Considerations for Steel Building - 2004.

D. ASTM A36 - Specification for Structural Steel.

E. ASTM A 53 - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

F. ASTM A325-04b - Specification for High Strength Bolts for Structural Steel Joints.

G. ASTM A123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Ironand Steel Products.

H. ASTM A653- Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical Quality).

I. ASTM A463- Specification for Steel Sheet Cold Rolled Aluminum Coated Type 1 and Type 2.

J. ASTM A490 - Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

K. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

L. ASTM A501 - Hot Formed Welded and Seamless Carbon Steel Structural Tubing.

M. ASTM A529 - Structural Steel with 50,000 psi Minimum Yield Point

0. ASTM A570 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.

P. ASTM A572 - Specification for High Strength Low-Alloy Columbium-Vanadium Steels of

Structural Quality.

Q. ASTM A792 - Specification for Steel Sheet Aluminum Zinc Alloy Coated by the Hot Dip Process, General Requirements.

R. ASTM E1514 - Specification for Structural Standing Seam Steel Roof Panel Systems.

S. AWS A2.4-93 - Standard Welding Symbols.

T. AWS 01.1-96 - Structural Welding Code- Steel.

U. AWS 01.3-89 - Structural Welding Code - Sheet Steel.

V. MBMA Metal Building Systems Manual - 2006 Edition.

1.03 SYSTEM DESCRIPTION

The building shall include all primary and secondary structural framing members, connection bolts, canopies, roof extensions, covering, windows, doors, flashing, trim, fasteners, closures, sealer, insulation, gutters, downspouts, framed openings for louvers, and conveyors, and other miscellaneous items as stated in the specifications and/or shown or called for on the Drawings.

A. The Framing system shall be clear span with the exception of the two end wall columns which may consist of one or two interior end wall columns.

B. Bay spacing is shown on drawings.

C. Primary Framing: Rigid frame of rafter beams and columns, end wall columns.

D. Secondary Framing: Purlins, girts, eave struts, flange bracing, and other items detailed.

E. Lateral Bracing: Horizontal loads not resisted by main frame action may be resisted by cable, rod and/or diaphragm, portal frames, fixed base columns in the sidewall. Diaphragm and/or cable, rod, portal frame, and fixed base columns in the endwall. Cable, rod, and/or diaphragm in the roof.

F. Wall and Roof System: Preformed steel panels, insulation, and accessory components.

G. Roof Slope: As shown in Volume II.

H. Dimensional Terminology:

1. The building "Width" shall be the measurement from outside face to outside face of the sidewall girts.

2. The building "Length" shall be the measurement from outside face to outside face of the endwall girts.

3. Eave" to be determined as the line along the sidewall formed by the intersection of the planes of the roof and sidewall.

4. "Eave Height is defined as the vertical dimensions as measured from the finished floor to the top of the eave strut.

5. The "Bay Spacing" shall be the measurement as follows:
   a. Interior Bay Spacing: The distance between the centerlines of interior frames.
   b. End Bay Spacing: The distance from the outside face of endwall girt to the centerline of the adjacent interior frame.

I. Building Type:

1. Clear Span Building - The building shall be of the single-gable, rigid frame type with vertical columns (uniform depth) located at the building sidewalls only. The transverse rigid frame shall be fabricated of shop-welded steel plate and designed for erection by field bolting.

1.04 DESIGN REQUIREMENTS

Standard Design Criteria

A. The buildings shall be designed in accordance to the latest editions of the IBC and all applicable City, governing agency, and State Codes.

B. All loads shall be proportioned and applied in accordance with MBMA Metal Building Systems Manual.

C. Deflection requirements shall be in accordance with the applicable provisions of the AISC Steel Design Guide Series 3 - Serviceability Design Considerations for Metal Buildings.

D. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 100 degrees F.

E. Roof drainage system to withstand rainfall intensity of 2 inches per hour with 15-minute duration.

1.05 SUBMITTALS

A. Contractor shall submit building drawings and calculations in accordance with Section 01300 Contractor Submittals. The drawings shall provide details describing footings and foundation support. The Contractor is responsible for providing sufficient building support for both seismic or wind loading whichever is greater in their design of the footings and stem wall.

1.06 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with MBMA Metal Building systems Manual,

and, for items not covered, AISC - Specification for Structural Steel for Buildings. Metal Building Manufacturer shall be AISC Certified Category MB.

1.07 QUALIFICATIONS

A. Manufacturer: The company manufacturing the products specified in this Section shall be a member of MBMA and shall have a minimum of 10 years experience in the manufacture of steel buildingsystems.

B. Structural framing and covering shall be the design of a licensed Professional Engineer experienced in design of this work.

1.08 FIELD MEASUREMENTS

A. Metal building contractor shall verify that field measurements are as indicated on erection drawings.

1.09 WARRANTY

A. Building manufacturer shall provide a Standard Limited Warranty of five (5) years.

B. Building manufacturer shall provide an aluminum-zinc alloy Coated Steel Panel Limited Warranty of twenty (20) years.

C. Building manufacturer shall provide a Panel Finish Limited Warranty of twenty (20) years.

D. Building manufacturer shall provide a Roof System Weather tightness Limited Warranty of (20) twenty years.

PART 2 - PRODUCTS

2.01 MATERIALS - STRUCTURAL FRAMING

A. Primary Framing Members:

1. Rigid frames, tapered beams, sidewall columns, and rafter beams shall be classified as primary structural framing.

2. Secondary structural framing shall include endwall columns, and canopy beams, purlins, girts, eave struts, headers, jambs, flange bracing, clips and other miscellaneous structural framing.

3. Primary Framing: Steel used to fabricate built up framing members shall be 50,000 PSI minimum yield point material and shall conform to the physical characteristics of one of the following:
ASTM 607 Grade 50

ASTM A570Grade 50

ASTM A572Grade 50
ASTM A529 Grade 50

4. Steel used for cold-formed members shall be 55,000 PSI minimum yield point material and shall conform to the physical characteristics of ASTM A570 Grade 55.

5. Steel used for interior pipe columns shall be 36,000 PSI minimum yield point material and shall conform to ASTM A53 Grade B (with Hydrostatic Test requirements excluded), ASTM A-501 straightness tolerance.

6. The building manufacturer shall have on file certified mill test reports, which verify that these requirements have been met.

7. Purlins and Girts: Steel used to form purlins and girts shall be hot rolled steel sheet with a guaranteed minimum yield point of 55,000 PSI and shall conform to the physical characteristics of ASTM A570 Grade 55.

8. Cable used for diagonal bracing shall be extra high strength Grade-? wire Class A coating, left hand lay, galvanized steel strand, conforming to the provisions of ASTM Specification A-475.

9. Structural steel members shall be sheared, formed, punched, welded and painted in the plant of the manufacturer. All shop connections shall be welded in accordance with the AWS 'Standard Code for Welding in Building Construction" and CWB 'General Specifications for Welding of Steel Structures."

10. Field connections shall be bolted with high strength bolts and nuts (ASTM A325 or SAE J429 Grade 5). Bolts and nuts shall be Hot-Dip Galvanized in accordance with ASTM A153.

11. Light-gauge cold-formed sections shall be manufactured by precision roll or brake forming. All dimensions shall be true, and the formed member shall be free of fluting, buckling or waviness.

12. Protective Coatings - All primary members shall be hot-dip galvanized. See specification 09800.

B. Secondary Structural Members:

1. Purlins and girts shall be precision roll-formed "C" sections or "Z" sections of adequate size and thickness as determined by the design criteria. Purlins shall be either simple span or continuous span members.

2. Eave struts shall be precision roll-formed and/or press broke "C" sections. The upper flange shall slope with the normal roof slope, and the web shall be vertical and free to receive the sidewall covering.

3. Wind bracing shall be accomplished by diagonal cable bracing, rod bracing, portal frames, and/or diaphragm action of the roof and wall covering. All cables for diagonal bracing shall be fabricated from extra high strength strand. Adjustment shall be provided by an eyeball assemble.

4. Flange bracing shall consist of angle or tubular bracing connected to the web of the purlin or girt and to the compression flange of the primary structural member.

5. Base support shall consist of a continuous base angle, base "C", or paneledge to which the base of the wall covering shall be attached. The base support shall be securely fastened into the concrete by the erector.

C. Structural Member Fabrication:

1. Framing Members: Clean in accordance with SSPC-5P2, prepare, and coat with building manufacturers standard primer.

2. Hot rolled members shall be fabricated in accordance with AISC Specification for pipe, tube, and rolled structural shapes.

3. Fabricate built-up members in accordance with MBMA Metal Building Systems Manual, Common Industry Practices.

2.02 MATERIALS - ROOF SYSTEM

A. General Roof Panel Requirements:

1. Installation of all factory assembled panels with insulating foam cores for the exterior roof(s) as shown on the contract drawings.

2. Installation of all trim, accessories, fasteners and sealants indicated on the contract drawings and/or as specified by the manufacturer as part of this section.

3. Furnish detailed drawings showing profile, gauge or thickness of interior and exterior sheets, location and type of fasteners, location, gauges, shapes and method of attachment of all trim, location and type of sealants and any other details as may be required for a weathertight installation.

4. Acceptable roof panel manufacturers:

   a. Metecno - API
   b. Approved Equal

5. Performance testing shall include the following:

   a. Structural Tests: Structural designs shall have been derived using recognized engineering calculations based upon witnessed tests of the physical properties of the panels including ASTM E-72. A deflection limit of L/240 shall apply to roofs.

b. Thermal Properties: When tested per ASTM C-236 or C-1363 panels shall provide a minimum R value of 8.0 per inch at 40° F mean temperature.

c. Air Infiltration: When tested per ASTM E-283 at a uniform static pressure of 20.0 psi, air infiltration shall not exceed 0.01 elm per sq. ft. of roof area.

d. Water Penetration: When tested per ASTM E-331 at a uniform static pressure of 20.0 psi, there shall be no uncontrolled water penetration through the panel joints.

e. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads of 20 psi (positive and negative loads), when applied for two million alternate cycles.

f. Code Compliance: Panels shall be in compliance with the 2006 International Building Code as evidenced by a current ICC-ES evaluation report. The urethane composite panel shall be qualified by the following fire tests and approvals:

i. ICC-ES Approval Report #ESR-1143
ii. UL Canada S-101, 102,126 and 127
iii. UL 263 Fire Resistance Rating
iv. FMRC Standard 4880 "50' Full Scale Corner Test"
v. Composite panels shall not exceed the following parameters when tested ASTM E-84 (IBC Standard 8-1):
Flame Spread: <25

Smoke Density: <450

vi. City of Los Angeles Research Report (RR 25351)

B. Roof Panel Products and Materials

1. Factory fabricated panel units shall consist of roll formed exterior and interior sheets bonded by foaming in place the urethane insulation core.

2. Panel units shall be AP900 or approved equal with profiles as indicated on contract drawings.

3. The longitudinal tongue and groove panel edges shall be formed to allow anchor clips and fasteners to be used as shown on the contract drawings.

4. 26-gauge or 24-gauge coated steel shall have a minimum yield strength of 80,000 PSI in accordance with ASTM A-792.

5. Metal face sheet shall be minimum 26 gauge galvanized steel conforming to ASTMA-653 Grade C or better hot dipped Commercial quality, Galvanized coating, designation G-90, with a profile as shown on the contract drawings. Metal liner sheet shall be 26 gauge G-90 galvanized steel.

6. The insulating R value of the roof panels shall be 22 or greater.

7. Metal The foam core of the panel shall be rigid urethane with a minimum 95% closed cell structure and shall have the following minimum physical properties:

    a. Density (in place): 2.3 - 2.6 pcf
    b. Compressive Strength: 26-34 psi
    c. Tensile Strength: 34-42 psi
    d. Shear Stress: 20-25 psi
    e. Moisture Vapor Transmission: 2.0 - 3.0 perms/inch

8. The core shall withstand humidity-aging at 158°F and 100% relative humidity for a period of 7 days with a volume increase of not more than 3% in accordance with ASTM D-2126.

9. The core shall withstand heat-aging at 200°F for a period of 7 days with a volume increase of not more than 2% in accordance with ASTM D-2126.

10. The core shall withstand cold-aging at-20°F for a period of 7 days with a loss in volume not greater than 0.0% in accordance with ASTM D 2126.

11. Trim shall be furnished by the panel contractor to match the gauge and finish on the panels.

12. Coatings shall be factory applied to coil before forming or embossing. Finishes shall be as shown on the approved drawings and shall be in accordance with "Specifications for API Facings and Finishes".

C. Execution and Installation

1. Examine alignment of the structural steel and/or panel support system prior to installation and do not proceed until any defects are corrected by the responsible contractor. Building tolerances shall not exceed maximums as defined by AISC specifications.

2. Install panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weathertight installation.

3. Provide a dry wipe-down cleaning of panels as they are erected.

4. Manufacturer shall provide panel contractor with printed instructions for recommended product storage and handling.

5. Upon determination of responsibility, repair or replace damaged panels and trim to the satisfaction of the engineer and/or owner.

6. Material is warranted for one year from date of installation provided such installation occurs within three (3) months from the date of shipment from the manufacturer.

2.03 MATERIALS -WALL SYSTEMS

A. Wall Panels Description:

1. Wall panels shall have 1-1/4 inch trapezoidal ribs spaced 12 inches on center and two stiffener ribs. Each panel shall provide 36" net coverage in width.

2. The panels shall be attached to the girts per the manufacturer's recommendations

3. All wall panels shall be continuous from sill to roof line except where lengths become prohibitive for handling purposes. All end-laps shall be at least 4".

B. Wall Panel Material: Sheet Steel Stock: Panel material shall be aluminum-zinc alloy-coated steel conforming to ASTM A792 for coating AZ50 or AZ55.

1. 26-gauge or 24-gauge coated steel shall have a minimum yield strength of 80,000 PSI in accordance with ASTM A-792.

C. Wall Insulation: Spray-in, closed cell polyurethane foam insulation with rating of R-7 per inch.

D. Closures at the eaves and rake and where panels end over or under a door, window, louver or other such wall openings, the wall panel corrugations shall be filled with pre-formed closed cell, laminated polyethylene foam closure when required for weather tightness.

E. Fasteners self-drilling, self tapping, HWH 410 stainless steel screws with sealing washers through flat of panel if "R" type panel or through rib if "A" type panel. Size to maintain load and weather tightness requirements.

2.04 MATERIALS - FOUNDATION

A. All building foundations shall be designed in accordance with local codes. Seismic and wind loading shall be considered. The Contractor shall reference the drawings and site specific soils report as described in Section 02900 in developing the design for the foundation.

B. Concrete shall be a minimum of 5,000 psi strength and provided in accordance with Section 03300 "Cast-In Place Concrete".

C. Reinforcing steel shall be provided utilizing Grade 60 steel. All steel provided for reinforcement in concrete shall be in accordance with Section 03200 Reinforcement Steel.

2.05 PANEL FINISH

A. Exterior Finish: panels shall be finished to meet or exceed the following criteria:

1. Prime coat: The base metal shall be pretreated and primed with epoxy or urethane type primer for superior adhesion and superior resistance to corrosion. The dry film thickness shall be 0.2 mils.

2. Exterior Coat: After priming, the exterior side shall be given a 20 year life coating baked in excess of 500 degrees F. to a controlled dry film thickness of 0.7 to 0.8 mills.

3. Excellent weatherability and resistance to coating deterioration shall be evident when subjected to the following tests:
   a. Humidity Resistance: Immediately after removal from cabinet, the exposed area shall contain less than 5% No. 8 blisters, after 1000 hours when tested according to ASTM D-2247.
   b. Salt Spray Resistance: Immediately after removal from cabinet, the exposed area shall contain less than 5% No. 8 blisters, after 750 hours when tested according to ASTM B-117.
   c. Specular Gloss: The gloss rating shall be 25-35 degrees on a Gardner 60 degree gloss meter when tested in accordance with ASTM 523.
   d. Hardness: The coating shall have a minimum paint hardness of F-2H using Eagle Turquoise drawing pencils.
   e. Q.U.V. Weatherometer: There shall be no objectionable color change, chalking or blistering after 300 hours when tested in accordance with ASTM G-53

B. Interior Finish: The interior finish shall have a parchment polyester top coat over an epoxy or urethane primer. The dry film thickness shall be 0.3 to 0.5 mils.

C. Color Selection: Exterior panel and trim colors will be selected from the Building Manufacturer's standard colors. Submit two (2) color charts with the proposal.

2.06 MATERIALS - TRIM

A. Exterior gutters shall be 24-gauge, G90 galvanized or aluminum-zinc alloy coated steel with the same finish as the wall panels. Color to by chosen by Owner from manufacturer provided color charts.

B. Downspouts shall be 28-gauge galvanized or aluminum-zinc alloy coated steel with a color coordinated, pre-painted finish. Color to be chosen by Owner from manufacturer provided color charts.

C. Standard rake trim shall be 26-gauge, G90 galvanized or aluminum-zinc alloy coated steel with the same finish as the wall panels. Color to be chosen by Owner from manufacturer provided color charts. If the roof is a Standing Seam or Loe-Seam system, the rake shall be attached tot he endwall material with t slip joint, allowing the rake to expand and contract with the roof system.

D. Wall trim shall be 26-gauge, G90 galvanized or aluminum-zinc alloy coated steel with the same finish as the wall panels. Color to be chosen by Owner from manufacturer provided color charts.

E. All gutter and downspout joints, rake flashing laps, ridge flashing laps doors, windows and louvers shall be sealed with Sika Sikaflex 201 caulk or equal. The caulk shall meet or exceed the requirements of Federal Specification TT-S-00230C, Type II, Class A.

2.07 ACCESSORIES

A. Provide accessories as shown in the drawings.

PART 3 - EXECUTION

3.01 RECEIVING, STORAGE AND HANDLING OF MATERIALS ON JOBSITE

A. All materials shall be unloaded, handled, hauled and delivered to storage by competent workmen in a manner, which will prevent bends, dents, scratches and other damage. Damaged materials shall be rejected and promptly replaced. All materials shall be properly stored and protected from weather damage by the Contractor. All shipments will be thoroughly checked by the project Contractor.

B. Primed Materials: Upon receipt, all bundles of primed material shall be stored on blocking at an angle sufficient to allow any trapped water to drain and should be protected from the weather by covers allowing air circulation. Water, ice and snow should not be allowed to collect and remain thereon.

C. Roof and Wall Panels: Bundles of panels shall be inspected for moisture upon receipt. If moisture is present, dry the panels and, if possible, store them in a warm, dryplace. The panel bundles shall be elevated and sloped in a manner to allow moisture to drain. Cover all bundles with a tarp or plastic, leaving airspaces for adequate air circulation.

3.02 ERECTION - GENERAL

A. The erection of the metal building and the installation of accessories will be performed in accordance with the Building Manufacturer's erection drawings and erection manuals by a qualified erector using proper tools, equipment and safety practices.

3.03 ERECTION - FRAMING

A. Erect framing in accordance with MBMA Metal Building Systems Manual, Common Industry Practices.

B. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection

equipment and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection. The temporary guys. braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.

C. Do not field cut or alter structural members without approval of the metal building manufacturer. After erection, prime, weld abrasions, and surfaces not shop primed.

3.04 ERECTION - WALL AND ROOFING SYSTEMS

A. Install in accordance with manufacturer's instructions

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

3.05 ERECTION - GUTTER AND DOWNSPOUT

A. Install gutters and downspouts in strict accordance with manufacturer's instructions.

B. Connect downspouts to yard drain piping.

3.06 INSTALLATION - ACCESSORIES

A. Install man doors and sectional, in accordance with manufacturer's instructions.

B. Seal wall and roof accessories weathertight.

3.2 TOLERANCES

A. All work shall be performed in a workmanlike manner.

B. Install Framing in accordance with MBMA Metal Building Systems Manual, Common Industry Practices.

END OF SECTION

SECTION 06600 - PLASTIC SURFACING MATERIALS

PART 1 – GENERAL

1.01 SUMMARY

Provide factory-finished Surface Materials, and similar items where shown on the drawings, as specified herein, and as needed for a complete and proper installation. Work may include, but is not limited to:

1. Standard Decorative Laminates.
2. Solid Surfacing.

1.02 REFERENCES

A. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

B. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

C. ISO 4586-2 - High Pressure Decorative Laminates; International Organization for Standardization.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Samples:

1. Selection Samples: Submit actual samples of surfacing materials to illustrate full range of colors, patterns, and finishes available.
2. Verification Samples: Submit two samples, each 12 inches square, illustrating each selected surfacing material in specified color, pattern, and finish.

B. Manufacturer's Instructions:

1. Submit manufacturer's printed installation instructions for each product.
2. Submit manufacturer's Safety Data Sheets (M.S.D.S.) for each adhesive.

1.05 PRODUCT HANDLING

N/A

1.06 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Not required

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

None required.

E. Extended Warranty:

Comply with the requirements of General Condition Article 6 and Section 01700.

PART 2 – PRODUCTS

2.01 STANDARD DECORATIVE LAMINATES

A. Acceptable Products: As indicated on the Drawings and in the Finish Schedule.

B. Product Description: Decorative surface papers, impregnated with melamine resins, bonded under heat and pressure to kraft papers impregnated with phenolic resins.

C. Standard Decorative Laminate – General Purpose Type: having the following physical characteristics:

1. Sheet thickness: 0.048-inch (1.219 mm) plus/minus 0.005-inch (0.127 mm).
2. Exceeding performance requirements of NEMA LD 3-1995 Grade HGS.
3. Surface burning characteristics in accordance with ASTM E 84; unbonded: Flame spread 55; Smoke developed 30.
4. Patterns and Finishes: Selected from manufacturer's full range of available selections, as selected and approved by Architect.

2.02 SOLID SURFACING MATERIAL

A. Acceptable Product: As indicated on the Drawings and in the Finish Schedule.

B. Product Description: Homogenous sheet material composed of acrylic resins, fire-retardant filler materials, and coloring agents.

1. Nominal sheet thickness: 0.50 inch (13 mm).
2. Surface burning characteristics in accordance with ASTM E 84: Flame spread less than 25; Smoke developed less than 25.
3. Liquid Absorption, ISO 4586-2, for 1/2-inch material thickness: 0.4 percent after 2 hours boiling water.

C. Izod Impact, ASTM D 256, Method A: 0.2 foot pounds per inch.

1. Tensile Modulus, ASTM D 638 Nominal: 1.7 million pounds per square inch.
2. Thermal Expansion, ASTM D 696: 0.000019-inch per inch per degree F, maximum.
3. Hardness, ASTM D 2583, Barcol Impressor: 59.
4. Flexural Modulus, ASTM D 790: 1.6 million pounds per square inch.
5. Deflection Temperature under load, ASTM D 648: 90 degrees C.
6. Stain Resistance: ANSI Z124.6 modified, Method 3.4: No effect.
7. Boiling Water Resistance, NEMA LD 3-1995, Method 3.5: No effect.
8. High Temperature Resistance: NEMA LD 3-1995, Method 3.6: No effect.
9. Radiant Heat Resistance: NEMA LD 3-1995, Method 3.10: No effect.
10. Light Resistance: NEMA LD 3-1995, Method 3.3: No effect.
11. Ball Impact Resistance, NEMA LD 3-1995, Method 3.8, one half pound ball, unsupported: 125 inches.
12. Specific Gravity: 0.977 ounces per cubic inch (1.69 grams per cubic centimeter).
13. Approximate weight: 4.2 pounds per square foot (20.5 kg/square m).
14. Weatherability: ASTM D 2565: Pass.
15. Fungus Resistance, ASTM G 21: Pass.

16. Bacterial Resistance, ASTM G 22: Pass.
17. Pittsburgh Protocol Toxicity: 66.9 grams.
18. Patterns and Finishes: Selected from manufacturer's full range of available selections, selected and approved by Architect.
19. Impact Resistance NEMA LD3-1995 (1/2 lb. Ball) SSV bonded to substrate*** Method 3.08 modified. 125" (No Failure)
20. Tensile Toughness ASTM D 638. 21 (in. – lb./in. ^{3})
21. Tensile Modulus ASTM D 638 Nominal. 1.7 x 10^{-5} lb./in.^{3}
22. Density 1.60 gram/cm^3
23. Approximate weight 4.2 lbs./ft^2
24. Pittsburgh Protocol Toxicity = 30 grams range

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

Surface preparation: Precondition surfacing materials and surfaces to receive surfacing materials in accordance with manufacturer’s printed installation instructions.

3.03 APPLICATION

Install materials in accordance with manufacturer’s printed instructions.

END OF SECTION

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SECTION 07120 - WATERPROOFING & DAMPROOFING

PART 1 -- GENERAL

1.01 SUMMARY

Work included: Provide and install membrane waterproofing where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 QUALITY ASSURANCE

A. This Contractor shall examine all surfaces before commencing work to see that they are in proper condition to receive his work. All surfaces shall be dry, smooth and clean. The Contractor shall immediately notify the Architect, in writing, of any defective work by others that might prevent him from properly performing his work in a first-class manner in accordance with these Specifications. He shall not proceed with any work until such defects are remedied and work approved by the Architect. This Contractor shall apply his work during normal working hours so that the project manager may have the opportunity to oversee the actual operation.

B. Use adequate numbers of skilled workmen 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.

C. The Contractor shall see that all sleeves, metal work, flashings and counter flashings, to be furnished and/or installed under other divisions of the Specifications, are properly installed and assume full responsibility for the water-tightness of all such work.

D. Guarantee: Written guarantee is required from the applicator, guaranteeing this work against defective workmanship for a period of two years from date which the Owner records the Notice of Completion.

E. Certification: Upon completion, issue to the Architect a Certificate of Inspection and Compliance indicating that the completed work meets all the requirements of these Specifications and the manufacturer's printed instructions.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

C. Provide approved written guarantee per system specified; refer to Application Specification of manufacturer.

1.05 PRODUCT HANDLING

N/A

1.07 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

See Item 1.03.E

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

See Item 1.03 D

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Membrane or membrane assemblies for concrete walls behind berms shall be such as to provide a watertight condition for the life of the building and shall be a waterproofing Contractor approved by the manufacturer as manufactured by W.R. GRACE & CO. System shall apply Bituthene Waterproofing System 3000.

1. Bituthene 3000 Waterproofing Membrane is a factory-made composite product with a minimum thickness of 60 mils (1.5 mm). It consists of 56 mils (1.4 mm) of rubberized asphalt and 4 mils (0.1 mm) of cross-laminated polyethylene film. Bituthene 3000 is supplied in rolls 36" (0.9m) wide and 60' (18.3 m) long. The rubberized asphalt is covered with release paper that is removed during installation. The membrane is self-adhesive and cold applied. No special adhesive or equipment is necessary to form laps.

2. Physical Properties - Bituthene Liquid Membrane LM-3000:

Property:	Typical Value:	Test Method:
Solids Content	100%	ASTM D-1644
Elongation	250%	ASTM D-412
Peel Adhesion	5 lb./inch width	See footnote 1
Pliability (180° bend over 1" mandrel)	Unaffected at -25°F	ASTM D-146
Hydrostatic head	75 ft. min.	See footnote 2

Footnotes:

1. Liquid Membrane is applied to dry concrete blocks and cured for 7 days. Membrane is then peeled from the concrete blocks at a 90° angle.

2. Hydrostatic head tests are performed by applying liquid membrane on primed concrete, then sealing the waterproofed concrete to a pressure chamber. Water is introduced under pressure equivalent to 75 head feet.

3. Elastomeric membrane 3000 and 3100:

Property:	Typical Value:	Test Method:
Color	Dark gray-black	

Property:	Typical Value:	Test Method:
Pliability (180° bend over 1" mandrel)	Unaffected at -25°F (-32°C)	ASTM D-146
Tensile strength: membrane	250 (psi) minimum	ASTM D-412
Tensile strength: film	4000 (psi) minimum	ASTM D-412 (Die C) modified
Elongation - ultimate failure of rubberized asphalt (%)	300 minimum	ASTM D-412 (Die C) modified
Cycling over crack	No effect after 100 cycles at 15°F (-26°C)	See footnote 1
Cycle over 1" joint	No effect after 1000 cycles at 15°F (-26°C)	See footnote 1
Puncture resistance-Bituthene Membrane (lb.)(stretched by blunt object)	40 minimum	ASTM E154
Puncture resistance: Polyethylene film	250 minimum (in. oz. tear)	ASTM D781 (Impact from sharp object)
Peel Adhesion	(Lb./in. width)	
Resistance to hydrostatic head	150 ft. of water minimum	See footnote 2
Exposure to fungi in soil 16 wks	Unaffected	GSA-PBS 07111
Permeance-perms	0.1 Maximum 0.2 (Grains/sq.ft./in.Hg)	ASTM E-96 Method B
Water Absorption: 72 hrs	0.25 maximum (% By weight)	ASTM D-1228

Footnotes:

1. Membrane is applied across two primed blocks with no separation between blocks. At -15°F. blocks are pulled apart to 1/4", then returned to original position. Cycle is repeated 100 times. For joint cycling, the blocks are double covered with membrane, separated by 1", then cycled at -15°F between 3/4" and 1 1/4" a minimum of 1000 cycles.

2. Hydrostatic head tests are performed by applying membrane on primed concrete, then sealing the waterproofed concrete to a pressure chamber. Water is introduced to 150 head feet.

B. Bituthene Primer P-3000 is a rubber-based primer in solvent specifically formulated to provide good initial adhesion and excellent permanent adhesion of Bituthene Waterproofing Membranes.

C. Bituthene Elastomeric Mastic EM-3000 is rubberized asphalt base mastic.

D. Bituthene Liquid Membrane LM-3000 is a two-component, elastomeric cold-applied mastic grade material.

E. Bituthene Protection Board PB-3000 is lightweight, expanded polystyrene having a nominal density of 1.0 lb./cu. ft.

1. Bituthene PB-3000 shall have the following physical properties:

Property:	Typical Value:	Test Method:
Nominal Density	1.0 lb./cu. ft.	
Thermal Conductivity K factor (BTU/Hr./Sq. Ft./F.In.)	.24 @ 40°F .26 @ 75°F	ASTM C-177
Thermal Resistance (R-Value)	1" thickness = 4 3/4" thickness = 3	ASTM C-177

F. Bituthene Protection Board Adhesive PBA-3000 is a fast drying, rubber-based cement.

G. All materials shall be furnished by the manufacturer whose specification is used to the extent of his standard and/or stock materials. Materials unable to be furnished by the manufacturer shall meet his reference specification requirements.

1. Contractor shall furnish a statement signed by the manufacturer or his authorized representative that the materials to be supplied are proper for the use indicated and that the manufacturer is in agreement with the Contractor's use of these material systems as they are applicable to this installation.

2. All materials shall be delivered to the site in the original unbroken manufacturer's wrapping material with the original labels thereon.

PART 3 -- EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Verify that surfaces are solid, free of frozen matter, loose particles, cracks, pits, rough projections, and foreign matter detrimental to adhesion and application of waterproofing.

B. Do not apply waterproofing to damp, frozen, dirty, dusty, or deck surfaces unacceptable to manufacturer.

C. The surface shall be inspected by a representative of the coatings manufacturer and by the waterproofing Contractor. A written notice to the prime Contractor shall be provided to indicate any substrate deficiencies that must be corrected prior to application of the waterproofing coatings. The start of the application work shall not commence until acceptance of the surface by the waterproofing Contractor and the representative of the manufacturer.

D. Surface preparation: A smooth monolithic concrete surface is required. A broom surface is not acceptable. The concrete surface shall be dry, frost free, clean and cured a minimum of seven days prior to the application. The primer and membrane surface shall be free of voids, spalled areas, sharp projections, loose aggregate, and form release agents. Concrete curing compounds containing oil, wax or pigments shall not be used. Form release agents shall be the self-dissipating type that will not transfer to the concrete. Any surface defects such as cracks, holes or cavities shall be filled and finished flush with a Portland cement grout or concrete. Top surfaces of projecting ledges, below grade, except footings, shall be finished to a steep bevel with Portland cement mortar. Smooth concrete block walls shall be protected with membranes by striking off joints flush with surface.

3.03 INSTALLATION

A. Foundation Walls and Vertical Surfaces

1. General: The membrane, when in place, must withstand a minimum static ground water pressure of 150 feet (46 m).

2. Priming: Application of primer shall be limited to what can be covered by Bituthene Waterproofing Membrane in a given workday. Primed areas not covered by membrane during the workday will be re-primed. Apply primer by spray, roller or brush at a rate of 250-350 square feet per gallon. Roller should be a natural material such as lamb's wool, having a nap of approximately one inch. Primer shall be applied to a clean, dry, frost-free and dust-free surface. Sufficient primer must be used on the dry surface to condition it to a dust-free state suitable for the application of Bituthene Waterproofing Membranes. Coverage of primer will vary due to the texture and porosity of the surface to receive the primer.

    a. Bituthene Primer P-3000 should not be applied below 40°F (5°C) on vertical surfaces. At temperatures below 40°F (5°C), Bituthene P-3100 Primer must be used and it may be used up to 90°F (32°C). Allow P-3000 to dry one hour or until tack-free. Allow P-3100 to dry 30 minutes.

3. Membrane Installation: Apply Bituthene Waterproofing Membrane vertically in sections of 8 feet in length or less. On higher walls apply two or more sections with the upper overlapping the lower by at least 2-1/2" (64 mm). Press all membrane in place with heavy hand pressure or rollers during application. Two piles of Bituthene Membrane are recommended for below grade or earth shelter applications on any wood surfaces.

4. Sealing Edges: Bituthene Waterproofing Membrane shall be applied over the edge of the slab or over the top of the foundation or parapet wall. If the membranes are terminated on the vertical surface, a reglet or counter flashing may be used or the membrane may be terminated directly on the vertical surface by pressing very firmly to the wall. Press the edges with a metal or hardwood tool such as a hammer or knife handle. Apply a troweled bead of Bituthene EM-3000 to all vertical and horizontal terminations. Bituthene Liquid Membrane LM-3000 can be used as an alternative method.

5. Sealing Seams: All edges and seams must be overlapped at least 2-1/2" (64 mm). Apply succeeding sheets with a minimum 2-1/2" (64 mm) overlap and stagger end laps. Roll or press the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with Bituthene Membrane. Slit any fish mouths, overlap the flaps, and repair with a patch of Bituthene and press or roll in place. The edges of the patch shall be sealed with a troweling of EM-3000. Laps within 12" (300 mm) of all corners shall be sealed with a troweling of EM-3000.

6. Corner Forming: Outside corners must be free of sharp edges. Inside corners should receive a fillet formed with Liquid Membrane LM-3000, latex modified cement mortar (such as Daraweld C mixed with cement mortar) or epoxy mortar. Do not use fiber or wood cants. One of two methods may be used for treating corners:

    a. Apply Bituthene Liquid Membrane LM-3000 six inches (150 mm) in each direction from the corner and form a fillet with a minimum 3/4" (19 mm) face.

    b. Install an 11" (280 mm) minimum strip of Bituthene membrane centered on the corner. Install Bituthene Membrane over the treated inside and outside corners.

7. Protection of Membrane: The Bituthene Protection System shall be used on foundation walls and vertical surfaces subject to damage from other trades.

B. Horizontal Surfaces

1. Priming: Application of primer shall be limited to what can be covered with Bituthene Waterproofing Membrane in a given workday. Primed areas not covered by membrane during the workday shall be re-primed. Apply by spray, roller or brush at a rate of 250 to 350 square

feet per gallon. Roller should be a natural material such as lamb's wool, having a nap of approximately one inch (25 mm). Primer shall be applied to a clean, dry, frost-free and dust-free surface. Rollers should be dipped into pans to avoid pouring primer directly on the deck and creating puddles. Sufficient primer must be used to condition the surface to a dry, dust-free stale suitable for the application of Bituthene Waterproofing Membranes. Coverage of primer will vary due to the texture and porosity of the surface to receive the primer.

a. Bituthene P-3000 Primer should not be applied below 25°F (-4°C) on horizontal surfaces.

2. Membrane Installation: Bituthene Waterproofing Membrane shall be applied to the primed surface starting at the low point. Successive sheets should overlap preceding ones by 2-1/2" (64 mm). Two plies of Bituthene Membrane are recommended for below grade or earth shelter applications on any wood surfaces. All membrane shall be firmly rolled as soon as possible to minimize bubbles. Roller shall be a linoleum roller or standard water filled garden roller less than 30" (760 mm) wide, weighing approximately 75 pounds (34 kg) when filled. Cover the face of the roller with a resilient material such as 1/2" (13 mm) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Apply a double layer of Bituthene Membrane around posts or projections at least 6" (150 mm) in all directions and seal all terminations with Bituthene EM-3000. At drains, apply a bead of EM-3000 over a double layer of membrane under clamping rings. Apply EM-3000 at all terminations and at all "T" joints at the end of each workday.

   a. An alternate method is to apply Bituthene Liquid Membrane LM-3000 around posts and protrusions, overlapping the sheet membrane a minimum of 2" (50 mm). At drains, apply LM-3000 from the center of the drain out to the sheet membrane overlapping it by a minimum of 2" (50 mm).

3. Sealing Edges: Bituthene Waterproofing Membrane shall be turned up on surrounding walls and terminated into a reglet or under counter flashing, or the membrane may be terminated directly on the vertical surface by pressing very firmly to the wall. Press edges with a metal or hardwood tool such as a hammer or knife handle. Apply a troweled bead of Bituthene Em-003000 to all vertical and horizontal terminations.

4. Sealing Seams: All edges and end seams must be overlapped at least 2-1/2" (64 mm). Apply succeeding sheets with a minimum 2-1/2" (64 mm) overlap and stagger end laps. Roll the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with Bituthene Waterproofing Membrane. Slit any fishmouths, overlap the flaps, and repair with a patch and press or roll in place. The edges of the patch shall be sealed with a troweling of EM-3000. Laps within 12" (300 mm) of all corners shall be sealed with a troweling of EM-3000.

5. Corner Forming: Outside corners must be free of sharp edges. Inside corners should receive a fillet formed with Liquid Membrane LM-3000, latex modified cement mortar (such as Daraweld C mixed with cement mortar) or epoxy mortar. Do not use fiber or wood cants. One of two methods may be used for treating corners:

   a. Apply Bituthene Liquid Membrane LM-3000 6" (150 mm) in each direction from the corner and form a fillet with a minimum 3/4" (19 mm) face.

   b. Install an 11" (280 mm) minimum strip of Bituthene Membrane centered on the corner. Install Bituthene waterproofing membrane over the treated inside and outside corners.

6. Testing of horizontal waterproofing shall be by flooding the entire waterproofed area with a minimum 2" (50 mm) head of water for 24 hours. Mark any leaks and repair when the membrane is dry. Before flood testing, ascertain from the structural engineer that the structure will withstand the dead load of the water.

7. Protection of Membrane: After testing the horizontal surfaces and allowing for the membrane to dry, apply the Bituthene Protection System to the entire horizontal surface.

END OF SECTION

SECTION 07210 - THERMAL INSULATION

PART 1 -- GENERAL

1.01 SUMMARY

A. Furnish and install Thermal Insulation indicated on the Drawings and as specified herein.

B. The principal items of work include:

1. Thermal Insulation within roof.
2. Thermal Insulation within exterior walls.
3. Thermal Insulation within interior walls.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen 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.

B. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product data:

1. Materials list of items to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.05 PRODUCT HANDLING

N/A

1.06 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

Provide Certification per Item 1.03.B.

B. As-Builts:

Not required

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

None required.

E. Extended Warranty:

1. Comply with the requirements of General Condition Article 6.
2. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
3. Contractor Guarantee: Contractor guarantees the work covered by this specification against all defects in material and workmanship for a period of not less than FIVE (5) years from the date the Owner records Notice of Completion.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Provide thermal insulation as indicated on Drawings.

B. All insulation shall be inorganic glass fiber insulation. Insulation shall comply with ASTM Testing Standards. Fire Hazard Classification, Flame Spread Index, Smoke Developed Index, Combustibility, and Fire Endurance Ratings as required by Code.

C. Insulation shall be as manufactured by Certain-Teed, Johns-Manville, Owens-Corning, or Architect approved equal.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Verify adjacent materials are dry and ready to receive installation.

B. Verify mechanical and electrical services within walls have been installed and tested.

3.03 INSPECTION

A. Before any installation is started, determine that the other work is suitable to receive insulation.

B. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

C. Remove or protect against projections in construction framing that may damage or prevent proper insulation.

3.04 INSTALLATION

A. All work shall be performed by licensed applicators, shall comply with the recommendations of the manufacturer and the National Association of Insulation Manufacturers.

B. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane over and between framing numbers. Secure in place. Tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.

C. Trim insulation neatly to fit spaces. Use batts free of damage. Install batt insulation, in wall spaces without gaps or voids.

D. Install Insulation in all indicated walls from floor to underside of roof. Secure insulation with 19-gage wire or 1" wide, 20 gage steel strips. Architect shall approve all insulation details, including methods of fastening, before commencement of the work.

3.05 CLEAN UP AND DISPOSAL

At frequent intervals during and again upon completion of work, remove from building and working premises tools and equipment, surplus materials, all rubbish and debris of whatever nature not caused by other trades, and leave the work in a clean, orderly and acceptable condition approved by the Architect.

END OF SECTION

SECTION 07251 - WEATHER BARRIER

PART 1 -- GENERAL

1.01 SUMMARY

A. Weather barrier membrane.

B. Weather barrier membrane flashing

1.02 QUALITY ASSURANCE

Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
2. Submit manufacturer current technical literature for each component.
3. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

B. Mock-Up

1. Pre-installation Meeting: Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and weather barrier manufacturer's designated representative
2. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
   a. Mock-up size: [10 feet by 10 feet]
   b. Mock-up Substrate: Match wall assembly construction, including window opening.
   c. Mock-up may remain as part of the work.

1.05 PRODUCT HANDLING

N/A

1.06 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

Provide copy of Reports related to Item 3.08.

B. As-Builts:

Not required

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

None required.

E. Extended Warranty:

1. Comply with the requirements of General Condition Article 6.
2. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
3. Weather barrier manufacturer's warranty for weather barrier for a period of ten years from date of Substantial Completion.

PART 2 -- PRODUCTS

2.01 MANUFACTURER

E.I. du Pont de Nemours and Company ; 4417 Lancaster Pike, Chestnut Run Plaza 721, Wilmington, DE 19805; 1.800.44TYVEK (8-9835); http://construction.tyvek.com

2.02 MATERIALS

DuPont™ Tyvek® CommercialWrap® D and related assembly components.

2.03 ACCESSORIES

A. Seam Tape: 3" DuPont™ Tyvek® Tape as manufactured by DuPont.

B. Fasteners:

1. Steel Frame Construction DuPont™ Tyvek® Wrap Cap Screws.
2. Wood Frame Construction DuPont™ Tyvek® Wrap Caps.

C. Sealants

DuPont Commercial Tyvek Sealant or equal

D. Adhesives

Loctite Pro Series or equal

E. Primers

Loctite Pro Series or equal

F. Flashing

1. DuPont™ FlexWrap™ : Flexible membrane flashing materials for window openings and penetrations.
2. DuPont™ StraightFlash™: Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.
3. DuPont™ StraightFlash™ VF: Dual-sided flashing membrane materials for brick mold and non-flanged windows and doors.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendation.

B. Install weather barrier prior to installation of windows and door.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacture.

F. Window and Door Openings: Extend weather barrier completely over openings

G. Overlap weather barrier

1. Exterior corners: minimum 12 inches.

2. Seams: minimum 6 inches

H. Weather Barrier Attachment

Wood Frame Construction: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

3.03 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.04 OPENING PREPARATION for use with non-flanged windows – all cladding types

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.05 FLASHING for use with non-flanged windows – all cladding types

A. Use the 7-inch wide FlexWrap™ with 2 by 4 framing and 9-inch wide FlexWrap™ with 2 by 6 framing.

B. Cut DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.

C. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

D. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

E. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash™ at head of opening and lap sill flashing down to the sill.

F. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

G. Install DuPont™ FlexWrap™ at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

H. Coordinate flashing with window installation.

I. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.

J. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

K. Tape top of window in accordance with manufacturer recommendation.

L. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.06 OPENING PREPARATION for use with flanged windows

A. Cut weather barrier in a modified "I-cut" pattern.

1. Cut weather barrier horizontally along the bottom of the header.
2. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
4. Fold side and bottom weather barrier flaps into window opening and fasten.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.07 FLASHING (for use with flanged windows)

A. Use the 7-inch wide DuPont™ FlexWrap™ with 2 by 4 framing and 9-inch wide FlexWrap™ with 2 by 6 framing.

B. Cut DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.

C. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.

E. Install window according to manufacturer's instructions.

F. Apply 4-inch wide strips of DuPont™ StraightFlash™ at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.

G. Apply 4-inch wide strip of DuPont™ StraightFlash™ as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.

H. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

I. Tape head flap in accordance with manufacturer recommendations.

J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.08 FIELD QUALITY CONTROL

Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation.

3.09 PROTECTION

Protect installed weather barrier from damage.

END OF SECTION

SECTION 07550 - STANDING SEAM METAL ROOFING

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to comply with the Contract Documents, including, but not limited to, these major items:

1. Pre-finished, prefabricated standing seam roof system.
2. All related perimeter trim and flashings.
3. Any and all required clips, fasteners, closures, underlayments, and sealants, necessary to meet design criteria and ensure a weather-tight installation.
4. Coordination with installation of roofing substructure.
5. Coordination with installation of sheet metal.

1.02 SYSTEM REQUIREMENTS

A. Design Requirements:

1. Provide UL rated roofing system that has been tested in accordance with UL 580 test procedure.
2. Provide factory pre-formed panel system that has been pre-tested and certified by manufacturer to comply with all the specified requirements under installed conditions.

B. Structural Requirements:

1. Engineer panels for structural properties in accordance with the latest edition of American Iron and Steel Institute “Cold Formed Steel Design Manual”.
2. Provide confirmation of positive and negative buckling moments and uplift capacity determined by full-scale tests in accordance with ASTM E72-80 (Chamber Method).
3. Provide UL 90 Uplift testing reports, stating that the standing seam system has been tested over solid 5/8” minimum thickness plywood substrate.
4. The system must allow for panel movement due to thermal linear expansion.

C. Regulatory Requirements:

Comply with the requirements of all applicable building codes and other agencies having jurisdiction for wind uplift rating of standing seam roofs.

1.03 QUALITY ASSURANCE

A. Applicator shall possess all required licenses for work in this jurisdiction and have five years experience in installing standing seam metal roofs. Applicator shall supply a written two (2) year warranty covering all repairs required to maintain the roof and flashings in watertight conditions.

B. Manufacturer shall supply a twenty-year warranty on finish per ASTM D 2244-68 and ASTM D659-74.

1.04 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.05 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product data:

1. Materials list of items to be provided under this Section.

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

B. Shop Drawings

1. Provide small-scale drawings indicating layout of panels on entire roof.

2. Provide large-scale drawings of all edge conditions, joints, custom profiles, supports, anchorages, transitions and the like.

C. Submit samples of panel in color to be used on the project. Panel portions shall include part of seam and ridge.

1.06 DELIVERY AND STORAGE

A. Protect products and accessories from damage and discoloration during transit and at the site. Store sheets in a dry area to prevent condensation. Store flat and under cover until ready for use.

B. Deliver all materials in original packaging, identified with seals unbroken.

C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.07 EXTENDED WARRANTIES

A. Roofing Contractor shall warranty all work against defects in materials and workmanship for a period of two (2) years as required in the General Conditions prior to final payment.

B. In addition, the Finish shall have a twenty (20) year warranty against fading, chalking, peeling, cracking, chipping or delaminating.

PART 2 -- PRODUCTS

2.01 STANDING SEAM METAL ROOF

A. Manufacturer:

1. Acceptable products include TBC SS-200 Structural Standing Seam UL 90 panels by TBC/Tomen.

2. Submit for approval by Architect prior to submitting Bid.

B. Product:

1. Furnish: size(s), color(s), pattern(s) and shape(s) as indicated on the drawings.

2. Provide standard accessory shapes as required and as accepted by Architect.

3. Use appropriate trim shapes to conform to drawings.

C. Materials.

1. Metal roofing panels are to be manufactured from pre-finished Galvalume sheet consisting of 55% aluminum, 1.6% silicon and the balance in zinc per ASTM A792.

2. Panels are to be a minimum of 24-gauge and manufactured in 20” widths with 3/4” legs. Provide full-lengthened panels from ridge to eave.

3. Seam covers are to be 24-gauge material 1-1/2” high and located on 20” on center.

4. Provide a continuous, factory installed, high grade, sealant located at the upper inside edge of the seam cover.

5. Provide related flashings and trim to match roof finish. Any exposed trim to have an uninterrupted vertical face 6” in width and 22-gauge thickness.

6. Rake, Ridge and eave trim: provide trims compatible with the roofing system and manufacturer’s recommended attachments.

7. Hold down / panel clips as required for UL listing for 12-gauge Galvanized Steel with 22-gage stainless steel tabs.

8. Zee closures and sealants as required for weathertight insulation. Roofer shall be responsible for all materials and installation required to provide a complete guaranteed system.

2.02 FINISH

A. Fluoropolymer Coating: Full-strength 70% Kynar 500 coating baked on to form dry film thickness of 1.0-mil over a 0.3-mil baked-on epoxy primer, coated by a licensed applicator.

B. Finish is to be premium color unless noted otherwise on the Roof Plan or Exterior Elevations.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.

C. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and that cant strips and reglets are in place.

D. Beginning of installation means installer accepts existing surfaces.

3.02 GENERAL INSTALLATION

A. Provide one layer of #30 felt with horizontal overlaps and end laps staggered between rows. Lay parallel to ridge line with 4” horizontal laps and 12” vertical laps. Mechanically attach to substrate at 12” o.c.

B. Comply with manufacturer’s instructions for assembly, installation and erection as applicable to this project’s conditions and supporting substrate, in order to achieve weather-tight installation. Install with accordance to approved Shop Drawings. Panel seams shall interlock without use of field seaming machines. Compression ribs or button punching will not be allowed. Exposed fasteners in roofing panels will not be allowed.

C. Isolate materials at any point of contact with dissimilar metals by back coating metal with protective paint or applying tape between metals. Facilitate drainage to minimize possibility of galvanic action.

D. Installers shall use rubber sole shoes while working on the metal roof. Always protect the panel surface.

E. Fully seat adjacent panels to achieve continuous engagement of standing seam joint. Make end cuts and install sealant and flashings to achieve weathertight installation per manufacturer's recommendations.

F. Replace any materials that have been damaged or have deteriorated beyond successful repair per the Architect's review.

3.03 CLEANING

A. Remove temporary coverings and strippable films if any as each panel is installed.

B. Clean exposed surfaces of work promptly after completion of installation. Remove all metal clippings and filings carefully to avoid damage to the finish.

C. Protect work as required to ensure roofing will be without damage at the time of final completion.

D. Replace damaged work that cannot be restored to original condition.

END OF SECTION

SECTION 07600 - FLASHING & SHEET METAL

PART 1 -- GENERAL

1.01 SCOPE OF WORK

Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to comply with the Contract Documents, including, but not limited to, these major items:

1. All metal wall flashings, related flashing, coping and caps.
2. Flashing at curbed openings, and other miscellaneous areas where indicated on the drawings.
3. Flashing flanges for roof drains and overflows.
4. Flashing at parapet walls that receive roofing membrane.
5. Flashing and metal covers at mechanical equipment platforms.
6. Gutters and downspouts.
7. Shop and field priming, shop painting, galvanizing, screening, caulking, anchors and anchor straps, clips, etc.
8. Shop drawings of all sheet metal work including expansion joints.

1.02 QUALITY ASSURANCE

A. Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces.

B. Report to the Architect all conditions that prevent proper execution of this work.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Shop Drawings: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit: all information required for fabrication, finishing and installation of this work in complete details.

1.05 GUARANTEE

Contractor Guarantee: Contractor guarantees the work covered by this specification against all defects in material and workmanship for a period of not less than two (2) years from the date the Owner records Notice of Completion.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Galvanized Sheet Metal: Conform to ASTM A525, thickness indicated or specified, but not less than 24-gauge. Zinc coating shall weigh not less than 1-1/2 ounces, or more than 1-1/2 ounces per square foot of surface covered.

B. Solder: Standard Grade-A brand of 50:50 Alloy Lead-Tin, complying with ASTM B32. Name of manufacturer and grade designation shall be cast or die-marked on each bar.

C. Solder Flux: Raw muratic acid for galvanized metal and zinc; resin for tin, lead, and tinned copper; and non-corrosive soldering salts for uncoated copper.

D. Sheet Metal Fasteners: Rivets, nails, sheet metal screws, self-tapping screws, and stove bolts, of the type and size best adapted to the condition of use. Provide fasteners of the type specified or indicated.

1. Use: galvanized steel, cadmium-plated steel or 300 Series alloy stainless steel.

2. Pop rivets may be used for metal-to-metal connections when future disassembly is not required. Open-end type may be used for all applications except where watertight connections are required, in which case, use closed end type.

E. Caulking Compound: Provide as specified under Section 07900. Apply as recommended by the manufacturer; caulking compound of proper consistencies for gun and knife application as necessary.

F. Shop Prime Coat: Rust-Oleum Corporation. Apply #3202 to 1/2 mil wet coating thickness, #3268 to 1-mil dry coating thickness or provide primer as specified under Section 09900.

G. Shop Color Coat: Pre-coat in shop with coating of color to match adjoining surfaces.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 FABRICATION AND ASSEMBLY

A. Workmanship: Fabricate and finish metal work in a first class manner in accordance with best trade practices with all joints and corners accurately machined, filed and fitted, and rigidly framed together and connected. Carefully match components to produce perfect continuity of line and design. Make joints and connections in exterior face metal watertight, using approved scaling materials and methods of assembly. Fit faces of metal in contact with hairline joints, except as otherwise indicated or required for expansion or fitting. Conceal fastenings, unless otherwise indicated. Conceal required reinforcements within the finished assembly.

B. Expansion and Contraction: Form and fabricate work to adequately provide for thermal expansion and contraction and building movement in the completed work, without over-stressing the materials, breaking connections, or producing wrinkles and distortion in finished surfaces. Finish sheet metal work water and weathertight throughout.

C. Attachment Clips: Where subject to thermal expansion and contraction, attach members with clips to permit movement without damage to the installation, or provide slotted or over-size holes with washers where appearance is not critical, as approved by the Architect.

D. Lock Seams: Make lock seam work flat and true to line; sweat full of solder except where installed to permit expansion and contraction. Lap flat lock seams, and lap seams where soldered, according to pitch but in no case less than 4". Make seams in direction of flow. Fill expansion joints with sealant. Plane surfaces shall be free of buckles. Provide reinforcement as necessary.

Cleat and fasten substantially on approximately eight-inch centers. All cap flashing and gutter seams to be flat lock seams.

E. Soldering: Thoroughly clean and tin material prior to soldering. Solder with heavy coppers of blunt design, properly tinned before use. For flat seam work they shall not weight less than ten pounds per pair, and for other work not less than size pounds per pair. Solder slowly with well-heated coppers, heating the seams thoroughly and completely filling them with solder. Finish surfaces neatly, full flowing and smooth. Wash acid flux thoroughly with a soda solution after soldering and completely remove soldering flux on exposed surfaces.

F. Welding: Conform to the requirements of AWS "Standard Code for Arc and Gas Welding". Perform welding in a manner resulting in strong, durable, tight, flush, smooth, and clean joints. Weld sheet steel to produce full and complete fusion welds without inducing locked-in stresses in the metal or surface distortions. Welding on exposed surfaces shall be ground smooth and flush and finished to match adjacent surfaces.

G. Caulking: Where indicated, caulk joints in sheet metal work and between sheet metal work and adjacent construction with polysulfide sealing compound. Apply in accordance with Caulking and Sealants Section.

H. Coping: Shall be attached to top of parapets in strict conformance with the latest written specifications of the Sheet Metal Industry Fund of Los Angeles, and as indicated on the drawings.

I. All sheet metal work shall be examined carefully the Contractor, Owner and Architect and if necessary, tested. The Contractor shall make all repairs to damaged items as a result of this testing, leaving them in a condition satisfactory to the Architect.

END OF SECTION

SECTION 07711 - GUTTER SYSTEM

PART 1 -- GENERAL

1.01 SUMMARY

Provide labor, material, and equipment necessary for furnishing a complete installation of commercial gutter system.

1.02 QUALITY ASSURANCE

A. Where pre-engineered manufactured products are specified, other field fabricated or shop/field fabricated substitutions will not be accepted. However, where shop/field fabrications are indicated pre-engineered systems will be considered with Architect approval.

B. Obtain all components and related accessories from one single source manufacturer.

C. Follow manufacturer's printed instructions for installing commercial gutter system. Follow primary roofing manufacturer's printed instructions for installing associated roof material for flashing gutter system to roof.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product Data: Each type of product specified. Submit manufacturer's detailed technical product data, installation instructions and recommendations, dimensions of individual components, profiles, and finishes.

C. Shop Drawings: Show fabrication and installation of commercial gutter system including fully dimensioned roof plans, expansion joint locations, sections and details of components and other related trims.

D. Finish & Color Selection: Furnish manufacturer's technical data for specified finish and color chart showing full range of colors available.

1.05 DELIVERY, STORAGE & HANDLING

A. All products delivered shall be stored in a clean dry location prior to installation.

B. Products furnished with strippable protective masking shall not be exposed to direct sunlight for more than 30 minutes without removing masking.

C. Do not install finished materials with scars or abrasions.

1.06 PROJECT CONDITIONS

A. Coordinate work of this Section with adjoining work for proper sequencing to ensure protection from inclement weather and to protect materials and their finish against damage.

B. Do not install commercial gutter system during inclement weather. When installing in cold climates, warm adhesives, caulks, and primers to at least 50 degrees Fahrenheit prior to application.

1.06 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

None required.

E. Extended Warranty:

1. Comply with the requirements of General Condition Article 6.
2. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
3. Warranty Period - Concrete Roof Tile: Lifetime transferable limited product warranty for concrete roof tile. Manufacturer shall warrant the products against manufacturing defects and shall include material and labor to repair or replace defective materials as specified in manufacturer's warranty.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

A. Provide commercial gutter system, accessories, and drainware as manufactured by Custom-Bilt Metals, 13940 Magnolia Avenue, Chino, CA 91710.

Toll Free: 1-800-826-7813. Website: www.custombiltmetals.com

2.03 MATERIALS & FABRICATION

A. Concealed Gutter Liner shall be manufactured from 0.040" mill finished aluminum in

10'-0" lengths. Liner shall be:

1. Factory notched to receive brackets and straps.
2. Manufactured with 1" telescoping and notched end laps.
3. Factory punched with fastening holes elongated to allow for thermal movement.

B. Support Bracket and retainer stem shall be manufactured from 0.125" x 1.00" extruded aluminum bar, helliarc welded construction, factory punched for fasteners.

C. Interior Straps shall be manufactured from 0.125" x 1.00', extruded aluminum.

D. Contemporary Profile, snap-on fascia, shall be manufactured from 0.040" aluminum,

10'-0" lengths. Fascias shall be press formed with radius dies on a CNC Press to provide repeated true and accurate profiles.

E. Fascia Splices shall be manufactured from 0.040" aluminum, 6" lengths, formed to fit the inside of the snap-on fascia.

2.04 ACCESSORIES

A. Mitered Corners: provide factory mitered corners for both fascia and liner. Fascia profiles shall be precision saw cut, helliarc tack welded to produce a picture frame joint. Concealed liner miter shall be precision saw cut with a continuous helliarc weld watertight joint.

B. Sculptured End Caps: provide factory mitered end caps for fascias. Fascia profiles shall be precision saw cut, helliarc tack welded to produce a picture frame joint.

C. Cornice Returns: if shown on drawings, provide Roman cornice returns at gutter terminations in lengths as indicated on plans.

D. Liner End Caps: provide mill finished aluminum liner end caps at all fascia end caps and wall abutments.

E. Liner Expansion Joint: provide manufacturer's elastomeric expansion joints at 40'-0" intervals or as shown on shop drawings.

2.05 DRAINWARE

A. Downspout & Elbows: provide downspout in sizes and locations as indicated on plans. Downspouts shall be manufactured from 0.040" aluminum, finished to match gutter fascia. Downspout elbows shall have helliarc welded joints.

B. Outlets: at all downspout locations provide aluminum outlets to connect liner to downspout.

C. Wall Brackets: provide wall brackets at 60" maximum spacing (minimum 2 brackets). Brackets shall be manufactured from 0.125" x 1.00" extruded aluminum bar, finished to match downspout.

2.06 FINISHES

A. General: Apply coatings to exposed aluminum components after fabrication for maximum coating performance and to prevent crazing, abrasion, and damage to finished surfaces.

B. Pretreatment: Aluminum components shall be pretreated with solutions to remove organic and inorganic surface soils, remove residual oxides, followed by a chrome phosphate conversion coating to which organic coatings will firmly adhere.

C. Coating Type: High Performance Coating, two-coat, shop applied, 70% Polyvinylidene Fluoride (PVDF) coating based on Elf Arkema Chemicals, Inc. Kynar 500 or Ausimont U.S.A., Inc. Hylar 5000 resin, meeting AAMA 2605 specification.

D. Color: Select from manufacturer's standard colors.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. The installer must examine substrates and conditions under which commercial gutter system will be installed. All wood plates and/or fascia boards shall be installed true, straight, and free of splits, cracks, or other irregularities. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Prior to the installation of the commercial gutter system, soffits, extenders, and associated cornice profiles shall be installed.

B. Installer shall thoroughly read and follow manufacturer's installation instructions before proceeding with installation.

3.03 INSTALLATION

A. General: The commercial gutter system shall be installed in strict accordance with manufacturer's printed instructions. Deviations from the instructions are not allowed.

B. Support Brackets: Layout support brackets to provide 1/2" slope in 40 linear feet. Install support brackets with #10 x 2" stainless steel wood screws.

C. Liner: Install concealed gutter liner onto support brackets and fasten to substrates with

1-1/2" aluminum or stainless steel nails. Rivet and seal liner joints with high grade exterior sealant as recommended by gutter manufacturer.

D. Expansion Joints: Install elastomeric expansion joints as shown on plans and/or shop drawings. Maximum expansion joint spacing shall be 40' centers.

E. Locate and install downspouts before proceeding with fascia installation.

F. Install fascia with concealed splice plates over support brackets and liner. Coordinate and align spacing of joints with associated trims if applicable. Plan spacing of joints so there are no sections of fascia shorter than 48" in length. Check horizontal alignment of fascia during installation and adjust as required. At downspout locations, neatly cut fascia to accommodate downspout.

G. Install interior straps by fully engaging them into liner and fascia, complete by securely riveting.

END OF SECTION

SECTION 07840 - FIRE STOPPING

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Work included: Provide firestopping where indicated on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. It is the intent of this section of the specifications to establish a single, competent source to be responsible for providing all labor, materials, products, equipment and services, to supply and install the firestopping and smoke seal work for the entire project, at the following locations, as indicated on the drawings:

1. Openings in fire rated walls, floors and roofs both empty and those containing penetrations such as cables, conduits, cable trays, pipes, ducts and similar penetrating items.
2. Gaps between fire-rated floor slabs and exterior curtain walls.
3. Gaps between fire-rated walls and exterior curtain walls.
4. Gaps located within expansion joints.
5. Gaps between the tops of fire rated walls and underside of fire rated floor or roof assemblies.
6. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
7. Openings at each floor level in fire rated shafts or stairwells.

1.02 RELATED WORK

A. Openings through Floors and Walls:

1. Fire Rated: Metal sleeves for fire rated openings through floors and walls shall be provided under applicable mechanical and electrical specification sections.
2. Non-Rated: Non-rated openings through floors and walls shall be sealed under applicable mechanical and electrical specification sections.

B. Firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies shall be sealed under applicable mechanical and electrical specifications sections and only in accordance with the equipment or device manufacturers' installation instructions. Firestopping and smoke seals around outside of such mechanical and electrical assemblies, where they penetrate fire rated separations, are the responsibility of this section.

1.03 REFERENCE STANDARDS/DOCUMENTS

A. ASTM E814 - Test Method of Fire tests of Through Penetration Firestops.

B. ANSI/UL 1479 - Fire Tests Of Through-Penetration Firestops

C. ANSI/UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems

D. UL: Fire Resistance Directory, Volume 2.

E. ITS: Directory of Listed Products.

F. Factory Mutual, Approvals Guide

1.04 SYSTEM DESCRIPTION

A. Firestopping Materials: Provide firestopping system(s) of sufficient thickness, width and density to provide and maintain a fire resistance rating, as indicated on drawings and in accordance with [UL], [WH], or [FM] design numbers.

B. Provide a seal completely filling all annular spaces to prevent the passage of flame, smoke and gases through the opening in the fire separation in which it is installed.

C. Material Compatibility: Provide materials which are compatible with all materials used in the system including materials used in or on penetrating items as well as all construction materials used in conjunction or contiguous with the system.

D. Accessories: Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems. Accessories include but are not limited to the following items:

1. Permanent forming/damming/backing materials
2. Temporary forming materials
3. Substrate primers
4. Collars
5. Steel sleeves

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products of this Section with minimum ten (10) years documented experience, and having a quality management system that is registered as conforming to the requirements of ISO9001.

B. Applicator: Company having a minimum of three (3) years experience in the installation of materials specified herein on projects comparable to this project. The firm shall have the written authorization of the firestopping material manufacturer (s).

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable local Building Codes for fire resistance ratings.

B. Provide materials, accessories and application procedures which have been listed by [UL], [WH], [FM] or [tested by a nationally recognized independent testing agency] in accordance with [ASTM E814], [ANSI/UL 1479], or [ANSI/UL 2079] to achieve the required fire protection rating(s).

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not proceed with the installation of firestopping materials when temperatures or weather conditions exceed the manufacturer's recommended limitations for installation.

B. Ventilate solvent based and moisture-cure firestopping per firestopping manufacturer's instructions by natural means or, where this is inadequate, by forced air circulation.

1.08 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.09 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Manufacturer's Data: Submit manufacturer's specifications, installation instructions and product data for each material required. Include [UL], [WH], or [FM] tested systems or designs to show compliance with the Contract Documents.

A. Shop Drawings: Submit shop drawings showing typical installation details including reinforcement, anchorage, fastenings and method of installation for each type of firestopping condition.

B. Samples: If requested, submit samples of each type of firestopping systems, smoke seals and accessories. Indicate location where material/system shall be utilized.

1.010 DELIVERY, STORAGE AND HANDLING

A. N/A

B. Deliver materials to Site in manufacturer's sealed and labelled containers intact. Handle and store materials in accordance with manufacturer's instructions.

1.011 PROJECT/SITE CONDITIONS

Comply with manufacturer's recommended requirements for temperature, relative humidity and substrate moisture content during application and curing of materials.

1.012 SEQUENCING AND SCHEDULING

Do not install firestopping system(s) until Work within opening has been completed. Coordinate with other applicable Sections. Schedule work of other trades so that firestopping applications can be inspected prior to being covered by subsequent construction.

1.013 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

Final Report related to Item 3.04.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

None required.

E. Extended Warranty:

Comply with the requirements of General Condition Article 6.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Provide firestopping silicone sealants, water-based sealants, intumescent sealant, mortars, or firestop devices from the following manufacturer:

A/D Fire Protection Systems Inc. or Architect approved equal.

2.02 MATERIALS

A. Provide a complete system of asbestos-free firestop systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of [ASTM E814], [ANSI/UL 1479], or [ANSI/UL 2079] and listed by [UL], [WH], or [FM] and in addition are approved by jurisdictional authorities and the Consultant.

B. A/D FIRE BARRIER Silicone Sealants: For use in: openings with penetrating items subject to high movement; multiple penetration systems; for combustible pipes up to 2-in. diameter; in control joints; in curtain wall joints; expansion joints; floor/wall joints; wall/wall joints; head of wall joints; and as a sealant for smoke barrier construction.

C. A/D FIRE BARRIER Intumescent Caulk: For general use as a firestop sealant with: insulated pipes; pipes; electrical cables and conduit; ducts.

D. A/D FIRE BARRIER Seal and Seal NS: Water based firestop sealants for use with: control joints; head of wall joints; floor/wall joints; wall/wall joints; multiple penetration systems; plumbing; mechanical; electrical; and where sprayed sealant application is required or desired.

E. A/D FIRE BARRIER Mortar: For use in: large openings; static non-moving penetrations such as cable trays; for multiple penetration systems; electrical and communication bundles; conduits; non-combustible sleeves; and insulated pipes.

F. A/D FIRE BARRIER Collars: For use in openings with single combustible pipe penetrations greater than 2-in. diameter.

G. A/D FIRE BARRIER Pillows: For use in openings with: cable tray; multiple cable penetrations; where retrofitting of penetrating items is anticipated, and as a temporary fire stop system.

H. Fire stop system ratings: Comply with applicable Building Code requirements for locations and ratings.

2.03 ACCESSORIES

A. Damming and backup materials, supports and anchoring devices: Non-combustible, to manufacturer's recommendations and in accordance with the tested system being installed as acceptable to jurisdictional authorities.

B. Primers: As required by firestopping manufacturer and compatible with selected system and contiguous materials.

C. Water: Potable.

D. Firestopping for vertical (wall) applications: Non-sag caulk or spray grade sealants, Mortar, Collars or Pillows.

E. Firestopping for horizontal (floor) applications: Non-sag caulk or self-levelling or spray grade sealants, Mortar, Collars or Pillows.

F. Firestopping for overhead applications: Non-sag caulk or spray grade sealants or Mortar.

G. Tape: Pressure sensitive masking tape as recommended by the firestopping manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Examine substrates, openings, voids, adjoining construction and conditions under which the Work is to be installed. Confirm compatibility of surfaces scheduled to receive firestopping.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Verify that penetrating elements are securely fixed and properly located with the proper space allowance between penetrations and surfaces of openings.

E. Do not proceed with Work until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Surfaces to receive firestopping shall be free of dirt, dust, grease, oil, rust, loose materials, form release agents, frost, moisture or any other matter which would impair the bond of firestopping material to the substrate of penetrating item(s).

B. Prime substrates in accordance with manufacturer's written instructions or recommendations. Confine primers to areas of bond; do not allow spillage or migration onto exposed surfaces.

C. Do not apply firestopping and smoke seals to surfaces previously painted or treated with sealers, curing compounds, water repellent or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

D. Ensure that anchoring devices, back-up materials, clips, sleeves, supports and other related materials used in the actual fire tests are provided.

E. Mask where necessary to prevent firestopping materials from contacting adjoining surfaces that will remain exposed upon completion of Work. Remove tape as soon as it is possible to do so without disturbing firestopping seal with substrates.

F. Installation is not to proceed until submittals have been completed.

3.03 INSTALLATION

A. Manufacturer's Instructions: Comply with [UL], [WH] or [FM] Listings and manufacturer's instructions for the type of material and condition of opening in each case. Consult with the manufacturer's technical representative to determine proper procedure for conditions not fully covered by printed instructions. Record in writing any oral instructions received, with copy to manufacturer.

B. Install firestopping with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal. Tool or trowel exposed surfaces. Remove excess firestopping material promptly as the Work progresses and upon completion.

C. Damming: Provide leak-proof dams as required to seal openings and contain liquid sealants, putty or mortar until cured. Install damming in accordance with manufacturer's instructions.

D. Damming Boards: Install forming/damming materials and other accessories of type required to support fill materials during their application and in the position needed to produce the shapes and depths required to achieve fire ratings of through-penetration fire stop systems.

1. Combustible Type: For temporary dams only. Remove after firestopping material has cured.

2. Non-Combustible Type: For temporary or permanent dams. Provide non-combustible type wherever damming material cannot be removed after applying firestopping materials.

E. Void Filler: Use materials recommended by the firestopping manufacturer to seal gaps created by non-combustible type damming boards and to seal around cables, conduits, pipes and where void filler material becomes part of the fire rated assembly.

F. Sealant: Install damming material or mineral wool as required. Apply sealant so air voids are not present and sealant is in full contact with penetrating items. Tool sealant to ensure substrate contact. Remove excess sealant in accordance with manufacturer's recommendations.

G. Mortar: Install damming material as required. Mix mortar in strict accordance with manufacturers instructions. Pump, trowel or hand pack mortar through openings to minimum thickness as recommended by manufacturer and as listed by [UL], [WH] or [FM], to achieve required fire rating.

H. Firestopping Mineral Wool: Install firestopping by compressing material to the minimum required by [UL], [WH] or [FM] listing. Apply firestopping in sufficient thickness, depth and density so as to achieve the required fire resistance rating. Use impaling clips to support and secure firestopping where required by tested system.

3.04 FIELD QUALITY CONTROL

A. Notify Consultant when completed installations are ready for inspection prior to concealing or enclosing an area containing firestopping materials.

B. Arrange for inspections by the Owners independent inspection and testing company, appointed and paid for by Owner.

C. Following field inspections, provide all repair as required to ensure compliance with the Contract Documents.

3.05 CLEANING AND PROTECTION

A. Upon completion of this work, remove all materials, equipment and debris from the site.

B. Leave work area and adjacent surfaces in a condition acceptable to the Consultant.

C. Leave installed work with sufficient protection to enable it to remain untouched until project turnover.

END OF SECTION

SECTION 07900 - CAULKING & SEALANTS

PART 1 -- GENERAL

1.01 SCOPE OF WORK

Work included: Throughout the work, seal and caulk joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air.

1.02 QUALITY ASSURANCE

A. Conform to Sealant and Waterproofers Institute requirements for materials and installation.

B. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

C. Use adequate numbers of skilled workmen 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.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product data: submit:

1. List of items that will be provided under this Section.
2. Manufacturer's Data: catalog cuts, dimensioned drawings, and other data needed to prove compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.05 PRODUCT HANDLING

N/A

1.06 CLOSE-OUT: also comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Not required.

C. Operation and Maintenance Data:

None required.

D. Extra Materials:

Provide for Owner's use a minimum of 2 percent, but not less than one tube, of the each of the sizes and colors used, boxed and clearly labeled.

E. Extended Warranty:

1. Comply with the requirements of General Condition Article 6.
2. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the

owner may have under the contract documents.

3. The guarantee specified herein shall include warranties against leakage, hardening, cracking, crumbling, melting, running, shrinking or staining adjacent surfaces.

4. Contractor Guarantee: Contractor guarantees the work covered by this specification against all defects in material and workmanship for a period of not less than five (5) years from the date of Substantial Completion.

PART 2 -- PRODUCTS

2.01 SEALANTS

A. Except as specifically otherwise accepted by the Architect, use only the types of sealants described as follows:

1. One component polyurethane sealant, moisture curing, low modulus, FS TT-S-0023OC, Type II, Class A, ASTM-C-920, Class 25, for vertical and horizontal joints in connection with all building materials. Do not use in traffic areas. Minimum ¼" joint; maximum 1-1/4" x 3/8"d.

    a. Dymonic by Tremco

    b. Sonolastic NP1 by Sonneborn

2. One-part silicone sealant, moisture curing, low modulus, FS TT-S-0023OC, Type II, Class A, FS TT-S-001543A, Class A, for vertical and horizontal joints in connection with aluminum, glass and concrete materials which require greater movement capabilities. Do not use in traffic areas. Minimum joint ¼" x 3/16"d; maximum1" x ½"d.

    a. Spectrum 1 by Tremco

    b. Omniseal by Sonneborn

    c. Dow Corning 790

3. One-part silicone sealant, medium modulus, neutral cure, FS S-0023OC, Type II, Class A, FS TT-S-001543A, Type II, Class A, ASTM C920, Class 25, for vertical and horizontal joints in connection with non-porous surfaces such as aluminum, glass, tile, laminated plastic and concrete. Do not use in traffic areas.

    a. Spectrum 2 by Tremco

    b. Omni Plus by Sonneborn

    c. Dow Corning 795

    d. Construction 1200 by GE

4. Multi-Component polyurethane sealant, FS TT-S-00227E, Type I, Class A, ASTM C920 for horizontal joints in traffic areas. Minimum 3/8" wide, depth to be 3/8" to ½" - use primer.

    a. THC-900/901 by Tremco

    b. Chem. Caulk 950 by Bostick

5. One-part translucent silicone sealant, low modulus, moisture curing, FS TT-S-0023OC, Type II, Class A, FS TT-S-001543A, Type II, Class A, for vertical joints in connection with butt glazing.

    a. 895 Silicone by Pecora

    b. Silglaze N by GE

6. One-part mildew resistant silicone sealant meeting requirements of FDA Regulation 21 CFR 177.2600, for vertical and horizontal joints in connection with non-porous applications as sealing around bathroom fixtures, shower-tub enclosures, sinks and urinals.

a. Dow Corning 786

b. Sanitary 1700 by GE

7. One-part siliconized acrylic latex polymer caulk, ASTM C834-76, for interior horizontal and vertical joints in connection with window and door buck perimeters, interior wall surfaces, etc.

a. AC-20 by Pecora

b. Acrylic Latex by Tremco

8. Roof Penetrations: Use asphalt mastic conforming to ASTM D491.

9. For other services, provide products especially formulated for the proposed use and accepted in advance by the Architect.

B. Colors:

1. The Architect will select Colors for each sealant installation to match adjacent finishes from a standard color list normally available from the specified manufacturers.

2. Should a matching standard color not be available from the accepted manufacturer except at additional charge, the Contractor shall provide such colors at no additional cost to the Owner.

3. In concealed installations, and in partially or fully exposed installations where so accepted by the Architect, use standard gray or black sealant.

2.02 PRIMERS

Use only those primers that are: non-staining, have been tested for durability on the surfaces to be sealed, and are specifically recommended for this installation by the manufacturer of the sealant used.

2.03 BACKUP MATERIALS

A. Use only those backup materials that are specifically recommended for this installation by the manufacturer of the sealant used, which are non-absorbent, and which are non-staining.

B. Acceptable types include:

1. Closed-cell resilient urethane or polyvinyl chloride foam;

2. Closed-cell polyethylene foam;

3. Closed-cell sponge of vinyl or rubber;

4. Polychloroprene tubes or beads;

5. Polyisobutylene extrusions;

6. Oil-less dry jute.

C. Preformed support strips for ceramic tile control joint and expansion joint work: Use polyisobutylene or polychloroprene rubber.

2.04 BOND-PREVENTATIVE MATERIALS

Use only one of the following as best suited for the application, and as recommended by the manufacturer of the sealant used:

1. Polyethylene tape, pressure-sensitive adhesive, with the adhesive required only to hold tape to the construction materials as indicated;

2. Aluminum foil complying with MIL-A-148E;

3. Wax paper complying with Fed. Spec. UU-P-270.

2.05 JOINT PACKING

Shall be installed in all joints to receive sealant. Material shall be a resilient type such as closed cell PVC

foam or as recommended by the manufacturer. Oakum or other types of absorptive materials shall not be used as packing material.

2.06 OTHER MATERIALS

A. For masking around joints, provide masking tape complying with Fed. Spec. UU-T-106c.

B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Concrete and ceramic tile surfaces:

1. Install only on surfaces that are dry, sound, and well brushed, wiping free from dust.
2. At open joints, remove dust by mechanically blown compressed air if so required.
3. Use solvent to remove oil and grease, wiping the surfaces with clean rags.
4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
5. Remove laitance and mortar from joint cavities.
6. Where backstop is required, insert the approved backup material into the joint cavity to the depth needed.

B. Steel surfaces:

1. Steel surfaces in contact with sealant:
   a. Sandblast as required to achieve acceptable surface for bonding.
   b. If sandblasting is not practical, or would damage adjacent finish, scrape the metal or wire brush to remove mill scale.
   c. Use solvent to remove oil and grease, wiping the surfaces with clean rags.
2. Remove protective coatings on steel by sandblasting or by using a solvent that leaves no residue.

C. Aluminum surfaces:

1. Remove temporary protective coatings, dirt, oil, and grease.
2. When masking tape is used for protective cover, remove the tape just prior to applying the sealant.
3. Use only such solvents to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, and which are non-staining.

3.03 INSTALLATION OF BACKUP MATERIAL

A. Use only the backup material recommended by the manufacturer of the sealant used, and accepted by the Architect for the particular installation, compressing the backup material 25% to 50% to achieve a

positive and secure fit.

B. When using backup of tub or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.

C. Interior and exterior joints where no backing has been provided or which is in excess of 3/4" deep shall be packed by this subcontractor with fiberglass or a suitable joint filler to reduce the depth to 1/2" maximum. Maximum movement: the width of the joint shall be at least four times its maximum movement.

3.04 PRIMING

A. Use only the primer recommended by the manufacturer of the sealant, and accepted by the Architect for the particular installation, applying in strict accordance with the manufacturer's recommendations as accepted by the Architect.

B. The priming of joints shall be by brush to reach all surfaces to which compound will be applied. Primer shall be provided on masonry, concrete and wood surfaces as recommended by sealant manufacturer. Primer shall not be applied to surfaces that will be exposed after caulking is completed.

3.05 BOND-BREAKER INSTALLATION

Provide an approved bond-breaker where recommended by the manufacturer of the sealant, and where directed by the Architect, adhering strictly to the installation recommendations as accepted by the Architect.

3.06 INSTALLATION OF SEALANTS

A. Prior to start of installation in each joint, verify the joint type according to details on the Drawings, or as otherwise directed by the Architect, and verify that the required proportion of width of joint to depth of joint has been secured.

B. Equipment:

1. Apply sealant under pressure with power-actuated or hand gun, or by other appropriate means.

2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.

C. Thoroughly and complete mask joints where the appearance of sealant on adjacent surfaces would be objectionable.

D. Install the sealant in strict accordance with the manufacturer's recommendations as accepted by the Architect, thoroughly filling joints to the recommended depth.

E. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.

F. Cleaning up:

1. Remove masking tape immediately after joints have been tooled.

2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.

3. The excess material shall be cleaned from the surfaces adjacent to the joint, following the caulking operation and the top of the compound deposit shall be left with a smooth even finish. No material is permitted on the exposed face of aluminum sections.

END OF SECTION

SECTION 08100 - METAL DOORS AND FRAMES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

Work under this section comprises of furnishing hollow metal doors and frames, including transom frames, sidelight and window frames with provision for glazed, paneled or louvered openings, fire labeled and non-labeled, as scheduled.

1.02 REFERENCES

A. Standards:

1. 2010 NFPA 80 – Fire Doors and Window
2. ANSI/SDI-100 – Recommended Specifications for Standard Steel Doors an Frames
3. ASTM-F 476 – Standard Test Methods for Security of Swinging Doors Assemblies
4. HMMA 862 – Guide Specifications for Commercial Security Hollow Metal Doors and Frames
5. SDI-105 – Recommended Erection Instructions for Steel Frames
6. SDI-107 – Hardware on Steel Doors (reinforcement application)
7. ANSI-A250.4 – Steel Doors and Frames Physical Endurance
8. UL10C - Standard for Positive Pressure Fire Tests of Door Assemblies
9. UL752 – Ballistic Standards

B. Codes:

1. 2009 NFPA-101 – Life Safety Code
2. 2009 CBC – California Building Code
3. ANSI-A117.1 – Accessible and Usable Building and Facilities
4. 2010 DOJ – ADA Standards for Accessible Design - DOJ

1.03 QUALITY ASSURANCE

A. Manufacturer shall be a member in good standing of the Steel Door Institute (SDI).

B. Use adequate numbers of skilled workmen 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.

C. Unless specifically otherwise accepted by the Architect, provide all products of this Section from a single manufacturer.

D. Fire Rated Door Assemblies:

1. All labeled fire door assemblies to be of a type that have been classified and listed in accordance with the latest edition of NFPA80 and test in compliance with NFPA-252, and UL10C. A physical label is to be affixed to the fire door at an authorized facility; embossed labels are acceptable on standard 3 sided door frames.
2. For openings required to be fire rated exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

3. Project requires door assemblies and components that are compliant with positive pressure and S-label requirements. Specifications must be cross-referenced and coordinated with hardware and other door manufacturers to ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies.

4. Certification(s) of compliance shall be made available upon request by the Authority Having Jurisdiction.

1.04 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.05 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product data: submit:

1. List of items that will be provided under this Section.

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

4. Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents.

5. Submit shop drawings. Shop drawings should include the following information:

a. Material thickness and/or gauge.

b. Door core material.

c. Mortises and reinforcements.

d. Anchorage types.

e. Locations of exposed fasteners.

f. Glazed, louvered and paneled openings.

g. Mounting locations of standard hardware

1.06 DELIVERY, STORAGE, AND HANDLING

A. The supplier shall deliver all materials to the project site; direct factory shipments are not allowed unless agreed upon beforehand. Supplier shall coordinate delivery times and schedules with the contractor.

B. Deliver doors cardboard wrapped or crated to provide protection during transit and jobsite storage. Provide additional protection to prevent damage to any factory-finished doors. Mark all doors and frames with opening numbers as shown on the contract documents and shop drawings.

C. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the architect. Otherwise, remove and replace damaged goods as directed.

D. Store doors and frames at the building site in a dry and secure place.

1. Place units on minimum 4” high wood blocking.

2. Avoid use of non-vented plastic or canvas shelters that could create a humidity chamber.

3. If cardboard wrapper on door becomes wet, remove carton immediately.

4. Provide 1/4" spaces between stacked doors to promote air circulation.

1.08 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

1. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
2. All doors and frames shall be warranted in writing by the manufacturer against defects in materials and workmanship for a period of one (1) year commencing on the date of final completion and acceptance.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

Subject to compliance with requirements, provide standard hollow metal doors and frames by one of the following:

A. Security Metals

B. Door Components

C. Ceco Corporation

D. Curries Company

E. Steelcraft Company

2.02 MATERIALS

A. All doors and frames shall be manufactured of commercial quality cold rolled steel per ASTM-A366 and A568 general requirements; galvanized to A60 or G60 or galvanealed to A40 minimum coating weight standard per ASTM-A924. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A569

B. Supports and anchors shall be fabricated of not less that 18-gauge sheet steel, galvanized where galvanized frames are used.

C. Where items are to be built into exterior walls, inserts, bolts and fasteners shall be hot dipped galvanized in compliance with ASTM-A153, Class C or D as applicable.

D. Rust inhibitive enamel or paint primer shall be used, baked on, and suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces on Steel Doors and Frames."

E. Where specified supply embossed steel doors with wood grain appearance. Wood grain shall follow the pattern of a stile and rail wood door with both vertical and horizontal grain patterns. Doors with vision lites are required to have wood grain window kits.

F. Finish: See Door & Hardware Schedule and Finish Schedules.

2.03 METAL DOORS

A. Provide 1 3/4" thick doors of materials and ANSI/SDI-100 grades and models specified below, or as indicated on drawings or schedules:

1. Interior Doors: Level 2, Model 2 – Seamless

   Interior doors shall be minimum 16-gauge steel with both lock and hinge rail edge of door intermittently welded, filled and ground smooth the full height of door. Acceptable Manufacturers/Products:

   a. Ceco: Regent-16-SEM

   b. Curries: 707N-16

   c. Steelcraft: LF16

   d. Architect Approved Equal

2. Exterior Doors: Level 3, Model 2 – Seamless

   Exterior doors shall be minimum 16-gauge galvanized or galvanealed steel with both lock and hinge rail edge of door intermittently welded, filled and ground smooth the full height of door. Exterior doors shall be insulated with a solid slab of expanded polystyrene or polyurethane foam permanently bonded to the inside of each face skin. The top of all doors shall be closed flush by the addition of a 16-gauge screwed-in top cap and sealed to prevent water infiltration. The bottom channel shall include weep-holes. Acceptable Manufacturers/Products:

   a. Ceco: Legion-16-SEM

   b. Curries: 707N-16

   c. Steelcraft: LF16-Polystyrene

   d. Architect Approved Equal

3. Security Doors: Level 3, Model 2 – Seamless

   Doors shall be minimum 14-gauge steel with both lock and hinge rail edge of door continuously wire welded the entire height of the door. Doors shall be reinforced, stiffened, insulated, and sound deadened with continuous 20 gauge vertical steel stiffeners spaced not more than 6" (152) apart. The stiffener ends shall be welded together at the top and bottom ends. All spaces between stiffeners shall be insulated with .75 pound density fiberglass insulation. The top of all doors shall be closed flush by the addition of a 14-gauge screwed-in top cap and sealed to prevent water infiltration. The bottom channel shall include weep-holes. Acceptable Manufacturers/Products:

   a. Ceco: Medallion-14

   b. Curries: 747T-14

   c. Steelcraft: BW14

   d. Architect Approved Equal

4. Bullet Resistant Doors

   a. Bullet resistant hollow metal doors shall be constructed with vertical steel stiffeners and fully welded vertical edge seams for enhanced strength and aesthetic appearance. Internal door construction and concealed armor plate shall vary and is dependent on the required ballistic rating. Provide ballistic level doors as follows:

i. Level 1: Super 38 Automatic

ii. Level 2: .357 Magnum Revolver

iii. Level 3: .44 Magnum Revolver

iv. Level 4: 30-06 Rifle

b. Subject with compliance to the outline requirements, provide products by the following manufacturers:

i. Ceco: Armorshield

ii. Curries: 847/857

iii. Security Metals

iv. Architect Approved Equal

B. All doors shall be reinforced for hardware as shown below where necessary to preclude the use of thru-bolts.

1. Exit Devices: 14-gauge

2. Door Closers: 12-gauge

C. All doors shall be beveled 1/8" in 2" and shall have top and bottom channels of not less than 16-gauge, flush or inverted, welded to the face sheets. Doors shall have a full height 14-gauge hinge rail reinforcement channel, or individual 10 gauge hinge reinforcements

D. All doors to conform to ANSI-A250.4 Level "A" criteria and shall be tested to 1,000,000 operating cycles and 23 twist tests. Certification of Level "A" doors is to be submitted with approval drawings by supplier upon request. Do no bid or supply any type or gauge of door not having been tested and passed these criteria

2.04 METAL FRAMES

A. Provide hollow metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on the drawings and schedules. Conceal fastenings unless otherwise indicated:

1. Interior Frames: Level 2, 16-gauge

2. Exterior Frames: Level 2, 16-gauge, galvanized or galvanealed

3. Security Grade Frames: 14-gauge

B. Acceptable Manufacturers/Products:

1. Ceco: SU Series

2. Curries: M Series

3. Steelcraft: F Series

C. All frames over 36" in width shall be 14-gauge.

D. Fabricate frames with mitered corners. Weld both the inside the throat of the corners and the face of the corners, re-prime at the welded areas. All welds to be flush with neatly mitered or butted material cuts.

E. All frames shall have minimum 7-gauge hinge reinforcements, 14-gauge lock strike reinforcing, and 12-gauge closer reinforcing.

F. All frames shall have minimum 7-gauge hinge reinforcements with an additional high frequency 12-gauge hinge reinforcement welded to the top hinge, 14-gauge lock strike reinforcing, and 12-gauge closer reinforcing.

G. Provide temporary shipping bars to be removed before setting frames.

H. Except on weather stripped frames, drill stops to receive three (3) silencers on strike jambs of single frames and two (2) silencers on heads of double frames.

I. Provide minimum 0.0179" thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings

2.05 DOOR LOUVERS

A. Fire-Rated Louver:

1. Each fire-rated louver shall have the listing mark of Underwriter's Laboratories Inc. affixed to louver assembly.

2. All louvers in fire-rated doors shall be 16-gauge cold rolled steel with stainless steel operating springs.

3. Louvers shall be sight-proof per SDI-111C.

B. Fixed-Blade Louver:

1. All fixed blade louvers shall be 18-gauge cold rolled steel with mitered and welded frames and countersunk mounting holes.

2. Louvers shall be sight-proof per SDI-111C.

3. Provide insect screen where louver occur in exterior doors.

2.06 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.

1. Clearances shall be no more than 1/8" at jambs and heads except between non fire rated pairs of doors which may be no more than 1/4."

2. Clearances shall be no more than 3/4" at the bottom of the doors.

3. Clearances shall be no more than 1/4" at thresholds and curbs allow unless otherwise detailed.

B. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel sheet.

1. All doors shall be of types and sizes on the drawings, and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Doors shall be strong, rigid and neat in appearance, free from warpage or buckle. Corner bends shall be true and straight and of minimum radius for the gauge of metal used.

2. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door. All such welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.

3. Top and bottom edges shall be closed with a continuous recessed 16 gauge steel channel extending the full width and spot welded to both faces. Exterior doors shall have an additional flush closing channel at the top edge. Opening shall be provided in the bottom closer for escape of entrapped moisture.

4. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully template hardware only. Where surface mounted hardware is to be applied, doors shall have reinforcing plates only, with drilling and tapping to be done in the field.

5. The Face sheets of Exterior and Security doors shall be stiffened by continuous vertical formed steel sections occupying the full thickness of the interior space between door faces. These stiffeners shall be not less than 20 gauge, spaced not more than 6" apart and securely

attached to both face sheets by spot welds not more than 4" o.c. Spaces between stiffeners shall be sound deadened and insulated the full height of the door with an inorganic non-combustible batt-type material.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

1. All door and louver frames shall be strong and rigid, neat in appearance, square, true and free of defects, warp and buckle. Molded members shall be clean cut, straight and of uniform profile and back-bends shall be as detailed.

2. Corner joints shall have all contact edges closed tight, with trim faces and stops mitered and continuously welded. All welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.

3. Unit frames for installation in stud partitions shall be provided with steel anchors of suitable design for welding to steel studs. Anchors shall be not less than 16-gauge and shall be securely welded inside each jamb. Anchors are to be spaced at 24" on center.

4. Dust cover boxes of not less than 26-gauge shall be provided at all hardware mortises on frames to be set in masonry or drywall partitions.

D. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

E. Unless otherwise indicated, provide exposed fasteners with countersunk flat or oval heads for exposed screws and bolts.

F. Labeled doors and frames shall be provided for those openings requiring fire protection ratings, as scheduled on the drawings. Such doors and frames shall be constructed as tested by the Underwriter's Laboratories, Inc., and shall bear their label for the required rating. Provide additional frame accessories as required to maintain the fire protection ratings once the frames are installed in the openings.

G. At exterior locations and elsewhere as shown or scheduled, assemblies fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies. Unless otherwise indicated, provide thermal-rated assemblies with a minimum U-value rating of 0.41 Btu/sq. ft. x h x deg F.

H. Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested according to ASTM E 1408, and classified according to ASTM E 413. Unless otherwise indicated, provide acoustical assemblies with STC sound ratings of 33 or better.

I. Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI-107 and ANSI-A115 Series specifications for door and frame preparation for hardware.

J. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site. Provide internal reinforcements for all doors to receive door closers and exit devices.

K. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

L. Provide glazing stops with minimum 0.0359-inch- thick steel or 0.040-inch- thick aluminum.

M. Provide non-removable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.

N. Provide screw-applied, removable, glazing beads on inside of glass and other panels in doors.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 FIELD MEASUREMENTS

Verify all opening dimensions in the field prior to fabrication and assembly of frames.

3.03 INSTALLATION

A. Install steel doors, frames, and accessories according to shop drawings, manufacturer's data, and as specified.

B. Comply with provisions of SDI-105, “Recommended Erection Instructions for Steel Door Frames,” unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.

5. Install fire-rated frames according to NFPA 80.

C. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100. Install fire rated doors with clearances specified in NFPA 80.

3.04 ADJUST AND CLEAN

A. Immediately after erection, sand smooth all rusted and damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

B. Immediately before final inspection, remove protective wrappings from doors and frames.

C. Final adjustments:

1. Check and readjust operating finish hardware items in hollow metal work just prior to final inspection.

2. Leave work in complete and proper operating condition.

3. Remove defective work and replace with work complying with the specified requirements.

END OF SECTION

SECTION 08500 - ALUMINUM WINDOWS

PART 1 -- GENERAL

1.01 SUMMARY

This section includes the following:

1. AA®900 ISOWEB® Fixed Window
2. Heavy Commercial Grade (HC rating)/Architectural Grade (AW rating)
3. Architectural details, product descriptions and product performance specifications are based on products manufactured by the Kawneer Company Inc.

1.02 REFERENCES

A. Aluminum Association (AA):

DAF-45	Designation System for Aluminum Finishes

B. American Architectural Manufacturers Association (AAMA):

1.	2605	Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
2.	611	Voluntary Specification for Anodized Architectural Aluminum.

C. American National Standards Institute (ANSI):

Z97.1	Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

D. American Society for Testing and Materials (ASTM):

1.	A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2.	A525	General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3.	A526	Sheet Steel, Zinc Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
4.	B209	Aluminum and Aluminum-Alloy Sheet and Plate.
5.	B221	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
6.	B308	Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded.
7.	C716	Installing Lock-Strip Gaskets and Infill Glazing Materials.
8.	C920	Elastomeric Joint Sealants.
9.	E283	Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.
10.	E330	Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
11.	E331	Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
12.	E773	Test Method for Seal Durability of Sealed Insulating Glass Units.
13.	E774	Sealed Insulating Glass Units.

E. Consumer Product Safety Commission (CPSC)

16 CFR 1201 Safety Standard for Architectural Glazing Materials

F. Federal Specifications (FS):

TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

G. Glass Association of North America (GANA):

Glazing Manual

1.03 SYSTEM DESCRIPTION

A. General: Commercial Grade Architectural Aluminum Windows, including glass and glazing, metal panels, perimeter trims, sills and stools, window installation hardware and accessories, shims and anchors, and perimeter sealing of window units.

B. Aluminum Windows include: Kawneer Company, Inc., AA®900 ISOWEB® Window in accordance with AAMA /WDMA/CSA 101/I.S.2/A440-05 Standard/Specification for Windows, Doors, and Unit Skylights for a Class and Grade of FW-HC90/FW-AW90 and in accordance with CAN/CSA-A440-00 Windows.

C. Test Units:

1. All test unit sizes and configurations shall conform to the minimum size in accordance with AAMA /WDMA/CSA 101/I.S.2/A440-05 for the designation FW-HC90/FW-AW90 and CAN/CSA-A440-00 Windows.

2. Units submitted for laboratory testing shall be units of the manufacturer's standard construction, glazed and assembled in accordance with the manufacturer's specifications and AAMA /WDMA/CSA 101/I.S.2/A440-05 and CAN/CSA-A440-00 Windows.

D. Fixed Window Performance Requirements:

1. Wind loads: Provide window system; include anchorage, capable of withstanding wind load design pressures of based on 85 mph, exposure C, Occupancy Category IV of an enclosed structure. The design pressures are based on the (California) Building Code; (2010) Edition.

2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E283 at a minimum size of 60" x 90" (1524 x 2286). Air infiltration rate shall not exceed 0.10 cfm/ft^2 at a static air pressure differential of 6.24 psf (300 Pa). The test specimen shall meet the Fixed rating of less than 0.25 (m^3/h)/m at 300Pa when tested in accordance with CAN/CSA-A440-00 Windows.

3. Water Resistance: The test specimen shall be tested in accordance with ASTM E547 and ASTM E331 at a minimum size of 60" x 90" (1524 x 2286). There shall be no leakage as defined in the test method at a static air pressure differential of 15 psf (720 Pa). The test specimen shall meet the B7 rating with no water leakage at 720 Pa when tested in accordance with CAN/CSA-A440-00 Windows.

4. Uniform Load Deflection: A minimum static air pressure difference of 90 psf (4310 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member. The test specimen shall meet the C5 rating when tested in accordance with CAN/CSA-A440-00 Windows.

5. Uniform Load Structural: A minimum static air pressure difference of 135 psf (6465 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load.

6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440-05.

7. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than 0.34 BTU/hr/ft^2/°F.

8. Condensation Resistance (CRF): When tested to AAMA Specification 1503 and CAN/CSA-A440, the condensation resistance factor (CFR) shall not be less than 67 (66 I-Frame).
9. Forced Entry Resistance: All windows shall conform to AAMA 1302.5.
10. Thermal Barrier Test: Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

1.04 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.

1.05 SUBSTITUTIONS

A. Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

B. Substitution Documentation. Provide for evaluation:

1. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
2. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for window system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum windows for a period of not less than ten (10) years. (Company Name)
3. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
4. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

1.06 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Product Data.
2. Samples
3. Shop drawings showing installation details for Architect's approval. These drawings shall also show elevations of windows, full-sized details of all sections of windows, collateral materials, details of anchorage and hardware.
4. Supplemental data shall contain instructions for storage, handling and erection of windows

B. Quality Assurance/Control Submittals:

Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

1.07 PRODUCT 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 window material and components to avoid damage. Protect window material against damage from elements, construction activities, and other hazards before, during and after window installation.

1.09 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

1. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
2. Manufacturer's Product Warranty: Submit, for Owner's acceptance, manufacturer's warranty for window system as follows: 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.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

A. Kawneer Company, Inc.

B. Vistawall (Oldcastle)

C. Arcadia

D. Architect approved equal.

2.02 WINDOW SYSTEM

A. Kawneer Aluminum Window System

B. Series: AA®900 ISOWEB® Thermal Window System

C. Window Member Profile: 2-5/8" (67) nominal dimension.

D. Finish/Color: (See 2.09 Finishes)

2.03 MATERIALS

A. Aluminum (Windows and Components): Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of Extruded Material Standard: ASTM B 221, 6063-T6 alloy and temper.

B. Steel Reinforcement: Complying with ASTM A 36/ A 36M for structural shapes, plates and bars; ASTM A 611 for cold-rolled sheet and strip or ASTM A 570/ A 570M for hot-rolled sheet and strip.

C. Glazing Gaskets: Dry glazing gaskets shall be an extruded EPDM in accordance with ASTM C864.

D. Glazing Sealant: Wet glazing material shall be a 100 percent silicone, neutral-cure sealant in accordance with AAMA 805.2-94, Group A.

E. Fasteners: Where exposed, shall be 300 Series Stainless Steel.

F. Thermal Barrier: The thermal barrier shall be Kawneer ISOWEB® consisting of two parallel glass fiber-reinforced nylon strips installed continuously and mechanically bonded to the aluminum.

2.04 ACCESSORIES

A. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

B. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

C. Sealants and joint fillers for joints at perimeter of window system as specified in Division 7 Section "Joint Sealants".

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

E. Glazing: Factory glazing as required and specified in Division 8 Section “Glazing”.

F. Coupling Mullions: Shall be extruded aluminum of 6063-T6 alloy and temper of profile and dimensions indicated on drawings. Mullions shall provide structural properties to resist wind pressure required by performance criteria and standards.

2.05 RELATED MATERIALS

A. Sealants: Refer to Division 7 Section “Joint Sealants”

B. Glass: Glass thickness and type shall be in accordance with glass manufacturer’s recommendations for prescribed design pressure. Refer to Division 8 Section “Glass and Glazing”.

1. Factory glazing (if required) shall be in accordance with manufacturer’s standard requirements.

2. Glazing materials shall be compatible with aluminum and those sealants and sealing materials used in composite structure which have direct contact with the gasket.

C. Insulation: Refer to Division 7 Section “Building Insulation”.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.06 COMPONENTS

A. The frame depth shall be not less than 2-5/8".

B. All frame members shall have minimum wall thickness of 0.070" and shall provide the structural strength sufficient to meet the specified performance requirements.

C. Glazing beads shall be extruded aluminum and shall be a minimum thickness of 0.060".

D. Reference to tolerances for wall thickness and other cross-sectional dimensions of window members are nominal and in compliance with AA Aluminum Standards and Data.

E. All references to dimensions for wall thicknesses and other cross-sectional dimensions of window members are nominal and in compliance with ANSI H35.2-1990.

F. All frame members shall be tubular.

2.07 FABRICATION

A. General: Fabricate components per manufacturer's installation instructions. When assembled, components shall be accurately fitted to produce hairline joints.

B. Window Frame Joinery: Mitered and mechanically clipped and/or staked.

C. Factory sealed frame and corner joints.

2.08 FINISHES

Factory Finishing -

Fluropon® (70% PVDF), AAMA 2605, Fluoropolymer Coating

Interpon® D2000, AAMA 2604, Powder Coating

Other:

2.09 FINISH

A. Cover all exposed areas of aluminum windows and components. Exterior finish shall be 70% Polyvinylidene Fluoride.

B. Type: high performance baked-on organic coating.

C. AAMA Specification: Comply with AAMA 2605.

D. Aluminum Association Designation: AA.M10.C22.A4X.

E. Color: Match existing City Hall

2.10 SOURCE QUALITY CONTROL

A. Single Source Quality: Provide aluminum windows specified herein from a single source.

B. Building Enclosure System: When aluminum windows are part of a building enclosure system, including entrances, entrance hardware, curtain walls, storefront systems, sliding glass doors, slope glazing, and related products, provide building enclosure system products from a single source manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. 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.

B. 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 window system and sill plate is level in accordance with manufacturer's acceptable tolerances.

C. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

D. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 INSTALLATION

A. General: Install window system in accordance with manufacturer's instructions and AAMA window 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.
3. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual.

3.03 FIELD QUALITY CONTROL

Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.04 PROTECTION AND CLEANING

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum window system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products.

C. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

D. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 08710 - FINISH HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Door Hardware, including electric hardware.
2. Card Access control system.
3. Power supplies for electric hardware.

B. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Conduit, junction boxes & wiring.
8. Folding partitions, except cylinders where detailed.
9. Access doors and panels, except cylinders where detailed.

1.02 REFERENCES:

Use date of standard in effect as of Bid date.

A. American National Standards Institute – ANSI 156.18 – Materials and Finishes.

B. ICC/ANSI A117.1 - 1998 – Specifications for making buildings and facilities usable by physically handicapped people.

C. ADA – Americans with Disabilities Act of 1990

D. BHMA – Builders Hardware Manufacturers Association

E. DHI – Door and Hardware Institute

F. NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Windows
2. NFPA 105 – Smoke and Draft Control Door Assemblies
3. NFPA 252 – Fire Tests of Door Assemblies

G. UL – Underwriters Laboratories

1. UL10C – Positive Pressure Fire Tests of Door Assemblies.
2. UL 305 – Panic Hardware

H. WHI – Warnock Hersey Incorporated State of California Building Code

I. Local applicable codes

J. SDI – Steel Door Institute

K. WI – Woodwork Institute

L. AWI – Architectural Woodwork Institute

M. NAAMM – National Association of Architectural Metal Manufacturers

1.03 QUALITY ASSURANCE:

A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / UBC Standard 7-2 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

E. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.

F. See 2.6.E for added information regarding resilient and intumescent seals.

G. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

H. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.04 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.05 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

A. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.

B. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, not the discrepancy in the submittal and request direction from Architect for resolution.

C. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

D. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: secured delivery direct to Owner's representative.

B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.07 PROJECT CONDITIONS AND COORDINATION:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.
4. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
5. Manufacturer templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.

1.08 COMMISSIONING:

A. Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.09 REGULATORY REQUIREMENTS:

A. Locate latching hardware between 30" to 44" above the finished floor, per California Building Code, Section 1133B.2.5.1.

B. Adjust doors to open with not more than 5.0 lbs pressure to open at exterior doors and 5.0 lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15 lbs.

C. Adjust door closer sweep periods so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door, per California Building Code Section 1133B.2.5.1

D. All hardware to meet California Building Code Sections 1133B.2.1, 1133B.2.5.1 and 1003.3.1.8l.

E. Thresholds: Comply with California Building Code Section 1133B.2.4.1.

F. Floor stops: Do not locate in path of travel. Locate no more than 4" from walls.

1.11 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

1. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
2. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:

1.	Locksets:	Three years
2.	Exit Devices:	Three years mechanical One year electrical
3.	Closers:	Ten years mechanical
4.	Hinges:	One year
5.	Other Hardware	Two years

PART 2 – PRODUCTS

2.01 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Bommer
Key System	(SCH) Schlage Primus	Owner Standard
Locks	(SCH) Schlage	Owner Standard
Exit Devices	(VON) Von Duprin	Owner Standard
Closers	(LCN) LCN	Owner Standard
Auto Flush Bolts	(IVE) Ives	DCI
Coordinators	(IVE) Ives	DCI
Silencers	(IVE) Ives	Rockwood
Push & Pull Plates	(IVE) Ives	Rockwood
Kickplates	(IVE) Ives	Rockwood
Stops & Holders	(IVE) Ives	Rockwood
Overhead Stops	(GLY) Glynn-Johnson	None available
Thresholds	(NGP) NGP	Zero
Seals & Bottoms	(NGP) NGP	Zero

2.02 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

2.03 LOCKSETS, LATCHSETS, DEADBOLTS:

A. Mortise Locksets and Latchsets: as scheduled.

1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.
3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
   a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
4. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
5. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
6. Deadbolts: stainless steel 1-inch throw.
7. Electric operation: Manufacturer-installed continuous duty solenoid.
8. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
9. Scheduled Lock Series and Design: Schlage L series, 06A design.
10. Certifications:
    a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
    b) ANSI/ASTM F476-84 Grade 31 UL Listed.

2.04 EXIT DEVICES / PANIC HARDWARE

A. General features:

1. Independent lab-tested 1,000,000 cycles.
2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
3. 0.75-inch throw deadlocking latchbolts.
4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.
6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-lb. maximum operating force per UBC Standard 10-4, and with 32 lb. maximum pressure under 250-lb. load to the door.
8. Flush end cap design as opposed to typical "bottle-cap" design end cap.
9. Comply with CBC Section 1003.3.1.9.

B. Specific features:

1. Lever Trim: breakaway type, forged brass or bronze escutcheon min .130" thickness, compression spring drive, match lockset lever design.
2. Rod and latch guards with sloped full-width kickplates for doors fitted with surface vertical rod devices with bottom latches.
3. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
4. Delayed Egress Devices: Function achieved within single exit device component, including latch, delayed locking device, request-to-exit switch, nuisance alarm, remote alarm, key switch, indicator lamp, relay, internal horn, door position input, external inhibit input plus fire alarm input. NFPA 101 "Special Locking Arrangement" compliant.
5. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.

2.05 CLOSERS

A. Surface Closers: 4041

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

2.06 OTHER HARDWARE

A. Automatic Flush Bolts: Low operating force design.

B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

D. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

E. Seals: Finished to match adjacent frame color. Resilient seal material: polyurethane, polypropylene, nylon brush, silicone rubber or solid high-grade neoprene as scheduled. Do not furnish vinyl seal material. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability.

1. Proposed substitutions: submit for approval.
2. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.
3. Non-corroding fasteners at in-swinging exterior doors.

F. Automatic door bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.

G. Thresholds: As scheduled and per details. Comply with CBC Section 1133B.2.4.1. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

1. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
2. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
3. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

H. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

I. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.07 FINISH:

A. Generally BHMA 626 Satin Chromium

1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.

B. Door closers: factory powder coated to match other hardware, unless otherwise noted.

C. Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

2.08 KEYING REQUIREMENTS:

A. Key System: Schlage Everest Primus high-security utility-patented keyway, interchangeable core throughout. Utility patent protection to extend at least until 2014. Key blanks available only from factory-direct sources, not available from after-market keyblank manufacturers. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner and I-R Security Technologies representatives to determine system keyway(s), keybow styles, structure, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system. Contractor will install permanent cylinders/cores.

1. Primus Level 9
2. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner's presence. Demonstrate that construction key no longer operates.
3. Temporary cylinders/cores remain supplier's property.
4. Furnish 10 construction keys.
5. Furnish 2 construction control keys.
6. Key Cylinders: furnish 6-pin solid brass construction.

B. Cylinders/cores: keyed at factory of lock manufacturer where permanent records are maintained. Locksets and cylinders same manufacturer.

C. Permanent keys: use secured shipment direct from point of origination to Owner.

1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.

D. Bitting List: use secured shipment direct from point of origination to Owner at completion.

PART 3 – EXECUTION

3.01 ACCEPTABLE INSTALLERS:

A. Can read and understand manufacturers' templates, suppliers hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.02 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.
2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.1.
3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.03 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.

2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees and maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.04 ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner’s satisfaction.
2. Adjust doors to fully latch with no more than 1 pound of pressure.
3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
4. Adjust door closers per 1.9 this section.

B. Inspection: Use hardware supplier’s consultant or consultant’s agent. Include supplier's report with closeout documents.

C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.
2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner’s personnel.
3. Identify items that have deteriorated or failed.
4. Submit written report identifying problems

3.05 DEMONSTRATION:

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.06 PROTECTION/CLEANING:

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.07 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. Miscellaneous Material:

END OF SECTION

SECTION 08800 - GLAZING

PART 1 -- GENERAL

1.01 SUMMARY

Section includes High performance architectural insulating glass.

1.02 REFERENCES

A. ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

B. ASCE 7 - "Minimum Design Loads for Buildings and Other Structures".

C. ASTM International (ASTM):

1. ASTM C 162 - Standard Terminology of Glass and Glass Products.
2. ASTM C 1036 - Standard Specification for Flat Glass.
3. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass -- Kind HS, Kind FT Coated and Uncoated Glass.
4. ASTM C 1172 - Standard Specification for Laminated Architectural Flat Glass.
5. ASTM C 1376 - Standard Specification for Pyrolitic and Vacuum Deposition Coatings on Flat Glass.
6. ASTM E 2188 - Standard Test Method for Insulating Glass Unit Performance.
7. ASTM E 2189 - Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.
8. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

1.03 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or other specified gas.

D. Sealed Insulating Glass Unit Surface Designations:

1. Surface 1 - Exterior surface of the outer glass lite.
2. Surface 2 - Interspace surface of the outer glass lite.
3. Surface 3 - Interspace surface of the inner glass lite.
4. Surface 4 - Interior surface of the inner glass lite.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: PPG Certified Fabricator Network, as acceptable to the manufacturer.

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

C. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for

each glass type.

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and industry organizations, including but not limited to those below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

2. GANA Publications: "Laminated Glazing Reference Manual"; "Glazing Manual."

F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.

2. Associated Laboratories, Inc.

G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

2. Lites more than 9 square feet (sf) (0.84 sq. m) in area are required to be Category II materials.

3. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sf in area, provide glazing products that comply with Category II materials, and for lites 9 sf. or less in area, provide glazing products that comply with Category I or II materials.

1.05 PERFORMANCE REQUIREMENTS

A. General: Provide glass capable of withstanding thermal movement and wind and impact loads (where applicable) as specified in paragraph B following.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

2. Design Wind Loads: Determine design wind loads applicable to the Project according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

a. Basic Wind Speed: 85 mph

b. Importance Factor: 1.5

c. Exposure Category: C

d. Wind Load Duration: Short duration, as defined in ASTM E 1300 or ASCE 7-05 for 3-second gust wind speed.

e. For monolithic-glass lites heat treated to resist wind loads.

f. For insulating glass.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from ambient and surface temperatures changes acting on glass framing members and glazing components.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1/4 inch (6.0 mm) thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
4. U-Factors: NFRC 100 expressed as Btu/ sq. ft. per h per degree F.
5. Solar Heat Gain Coefficient: NFRC 200.
6. Solar Optical Properties: NFRC 300.

1.06 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.07 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product Data: For each glass product and glazing material indicated.

C. Verification Samples: For the following products, in the form of 12 inch (305 mm) square samples for insulating glass units.

D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

F. Qualification Data: For installers.

G. Product Test Reports: For each of the types of glazing products.

H. Warranties: Special warranties specified in this Section.

1.08 PRODUCT HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.10 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

1. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.

2.Manufacturer's Warranty on Insulating Glass: Manufacturer's standard form in which the insulating glass unit manufacturer agrees to replace insulating-glass units that deteriorate during normal use within the specified warranty period. Deterioration of insulating glass units is defined as an obstruction of vision by dust, moisture, or a film on the interior surfaces of the glass caused by a failure of the hermetic seal that is not attributed to glass breakage, improper installation, or cleaning and maintenance that is contrary to the manufacturer's written instructions.

Warranty Period: 5-years from date of Substantial Completion.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE GLASS MANUFACTURERS

A. Insulated Glass: PPG Industries, Inc.

B. Security Glazing: Nippon Electric Glass Company (800) 426-0279.

C. Clear Fire-Rated Window Glazing: Pyrobel by Interedge (877) 376-3343.

D. Clear Fire-Rated Door/Sidelight Glazing: PyroEdge or Pyrobel by Interedge (877) 376-3343.

2.02 GLASS MATERIALS (As indicated on the Window Schedule):

A. General: Exposed "tong" marks are not acceptable.

B. Interior Tempered Glass: Clear, Tempered ¼” thick. Grade B (tempered), Style I (uncoated), Type I (float or plate).

C. Insulated Glass Units: Double pane ¼” units with edge seal; interpane ½” space purged with dry hermetic air; total unit thickness of 1 inch. Tempered as required by Code and indicated on drawings. Tinting as indicated on Window Schedule.

D. Interior Wired Glass: 1/4" clear wire glass.

E. Interior laminated glazing - one way: Two pieces of 1/8” clear float glass, tempered as required by code, laminated with .030 in. polyvinyl butyl plastic interlayer conforming to 16CFR 1201 Category II for one-way glazing.

F. Security Glazing: 11/16” thick, glazing assembly consisting of two outer lights of 1/8” clear chemically strengthened glass with a core of two 1/8” polycarbonate sheets laminated with four inter-layers of .50 inch thick urethane.

G. Clear Fire Glazing: Model as required for required Fire-Rated Assembly.

2.03 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.

3. For uncoated glass, comply with requirements for Condition A.

4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated or required.

C. Pyrolitic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolitic deposition process during initial manufacture, and complying with other requirements specified.

D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.

2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated or required.

3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

4. Sealing System: Comply with requirements in Section 07920 - Joint Sealants. Dual seal, with primary and secondary sealants of polyisobutylene and silicone.

5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

6. Spacer Material: Aluminum with mill or clear anodic finish.

7. Desiccant: Molecular sieve or silica gel, or blend of both.

8. Corner Construction: Manufacturer's standard corner construction.

2.04 FABRICATION OF GLAZING UNITS

Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.05 GLAZING COMPOUNDS

A. Glazing Compound: Modified oil type, non-hardening, knife grade consistency.

B. Butyl Sealant: Single component; Shore-A hardness of 10-20; black color; non-skinning.

C. Acrylic Sealant: Single component, solvent curing, cured Shore hardness, non-bleeding.

D. Silicone Sealant: Single component, non-bleeding, non-staining; Capable of water immersion without loss of properties.

2.06 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene; 80-90 Shore A durometer hardness; 4 inch minimum long x 1/4 inch thick.

B. Spacer Shims: Neoprene; 40-50 Shore A durometer hardness; 4 inch long on 18 inch centers for wet-glazed systems.

C. Glazing Clips: Manufacturer's standard type.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the area and conditions under which work of this Section will be performed.

B. Coordinate work with other trades as needed to assure that proper substrate are provided to receive work of this Section.

C. Verify surfaces of glazing channels or recesses are clean, square in plane, free of obstructions, and ready for work of this Section.

D. Verify weep holes in exterior frame are provided.

E. Correct conditions detrimental to timely and proper completion of the Work.

F. Do not proceed until unsatisfactory conditions are corrected.

G. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses.

3.03 EXTERIOR WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glass pane.

B. Install removable stops with pane centered in space by inserting spacer shims both sides at 18-inch intervals, 1/4 inch below sightline.

C. Fill gap between pane and stops with sealant to depth equal to bite of frame on pane, but not more than 3/8 inch below sightline.

D. Apply sealant to uniform line, flush with sightline. Tool or wipe sealant surface with solvent for smooth appearance. Security Glazing to be sealed with security sealant as recommended by manufacturer.

E. Drain or weep the sill of each opening to the outdoors at three points using 3/8-inch diameter weep holes or the equivalent.

3.04 INTERIOR COMBINATION METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, project 1/16 inch above sightline.

B. Place setting blocks at 1/4 points.

C. Rest glass on setting blocks and push against tape to ensure full contact at perimeter of pane.

D. Install: removable stops, spacer shims between glass, and applied stops at 18-inch intervals 1/4 inch below sightline.

E. Fill gap between pane and applied stop with sealant to depth equal to bite of frame on pane to uniform and level line.

F. Trim protruding tape edge.

3.05 INTERIOR WET METHOD (COMPOUND AND COMPOUND)

A. Install glass resting on setting blocks. Install applied stop and center pane by use of spacer shims at 18-inch centers, kept 1/4 inch below sightline.

B. Locate and secure glass pane using glaziers' clips.

C. Fill gaps between pane and stops with glazing compound until flush with sightline.

3.06 CLEANING

A. After installation, mark pane with an "X" by using plastic tape or removable paste.

B. Remove glazing materials from finish surfaces.

C. Remove labels after work is completed.

D. Clean glass with solvent and normal wash. Final cleaning and polishing shall be done prior to final inspection.

E. Remove and replace broken, scratched, chipped or otherwise defective glass with new materials and leave the entire installation in a neat, clean, and acceptable condition.

***** END OF SECTION *****

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SECTION 09250 - GYPSUM BOARD SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fire-Resistance Rated Gypsum Board

B. Mold and Moisture Resistant Gypsum Board

C. Fire-Resistance, Mold and Moisture Resistant Gypsum Board

D. Abuse Resistant Gypsum Board

E. Cement Board

1.02 PERFORMANCE CRITERIA

A. Abuse Resistant Gypsum Board

1. Classification:

a. Surface Abrasion: Level 1-3

b. Surface Indention: Level 1

c. Soft Body Impact: Level 1-2

2. Wall Assembly Fire-Resistance Rating: locations per the drawings.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

1.05 PRODUCT HANDLING

N/A

1.07 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

PART 2 - PRODUCTS

2.01 MANUFACTURER / PRODUCTS

Basis of Design: Products of National Gypsum Company

2.02 FIRE-RESISTANCE RATED GYPSUM BOARD

A. Basis of Design: Gold Bond® BRAND Fire-Shield C Gypsum Board.

B. Panel Physical Characteristics:

1. Core: Enhanced fire-resistance rated gypsum core
2. Surface paper: 100% recycled content paper on front, back and long edges
3. Long Edges: [Square] or [Tapered] at Contractor's discretion.
4. Overall thickness: 5/8 inch.
5. Panel complies with Type X requirements of ASTM C 1396 Standard Specification for Gypsum Board

2.03 MOLD AND MOISTURE RESISTANT GYPSUM BOARD

A. Basis of Design: Gold Bond® BRAND XP® Gypsum Board

B. Panel Physical Characteristics

1. Core: Mold and moisture resistant gypsum core.
2. Surface paper: 100% recycled content moisture/mold/mildew resistant paper on front, back, and long edges.
3. Long Edges: Square or Tapered at Contractor's discretion.
4. Overall thickness: 5/8 inch.
5. Panel complies with requirements of ASTM C 1396 Standard Specification for Gypsum Board.
6. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

2.04 FIRE-RESISTANCE RATED GYPSUM BOARD WITH ENHANCED MOLD AND MILDEW RESISTANCE

A. Basis of Design: Gold Bond® BRAND XP® Fire-Shield® C Gypsum Board

B. Type C, Panel Physical Characteristics

1. Core: Mold and moisture resistant, with enhanced fire-resistance rated gypsum core
2. Surface paper: 100% recycled content moisture/mold/mildew paper on front, back and long edges
3. Long Edges: Square or Tapered at Contractor's discretion.
4. Overall thickness: 5/8 inch.
5. Panel complies with requirements Type X of ASTM C 1396 Standard Specification for Gypsum Board
6. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

2.05 ABUSE RESISTANT GYPSUM BOARD

A. Basis of Design: Gold Bond® BRAND Hi-Abuse® XP® Gypsum Board

B. Panel Physical Characteristics

1. Core: Fire resistance rated gypsum core, with additives to enhance, surface indentation resistance and impact resistance.
2. Surface paper: Abrasion resistant, 100% recycled content moisture/mold/mildew resistant paper on front, back and long edges
3. Long Edges: Square or Tapered at Contractor's discretion.
4. Overall thickness: 5/8 inch.
5. Panel complies with Type X requirements ASTM C 1396 Standard Specification for Gypsum Board.
6. Surface Abrasion Resistance: 0.009 inch when tested in accordance with ASTM D 4977 Standard Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion
7. Indentation Resistance: 0.132 inch when tested in accordance with ASTM D 5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
8. Soft Body Impact: 210 ft-lbf when tested in accordance with ASTM E 695 Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading
9. Mold/Mildew Resistance: score of 10 when tested in accordance with ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

2.06 CEMENT BOARD

A. Cement Backerboard

1. Basis of Design: PermaBase® BRAND Cement Board
2. Panel Physical Characteristics
   a. Core: Cementitious, water-durable
   b. Surface: Fiberglass mesh on front and back
   c. Long Edges: Tapered
   d. Overall Thickness: 5/8 inch.
   e. Panel complies with requirements of ASTM C 1325 Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units and ANSI A118.9
   f. Density: 72 lbs. per cu. ft.
   g. Water Absorption: Not greater than 8% when tested for 24 hours in accordance with ASTM C 473 Standard Test Methods for Physical Testing of Gypsum Panel Products

B. Cement Board Underlayment

1. Basis of Design: PermaBase® BRAND Cement Board
2. Panel Physical Characteristics
   a. Core: Cementitious, water-durable
   b. Surface: Fiberglass mesh on front and back
   c. Long Edges: Tapered
   d. Overall Thickness: 1/4 inch
   e. Panel complies with requirements of ASTM C 1325 and ANSI A118.9
   f. Density: 72 lbs per cu. ft.

g. Water Absorption: Not greater than 8% when tested for 24 hours in accordance with ASTM C 473 Standard Test Methods for Physical Testing of Gypsum Panel Products

2.07 ACCESSORY PRODUCTS

A. Acoustical sealant

1. Conform to ASTM C 919 Standard Practice for Use of Sealants in Acoustical Applications
2. Products/Manufacturer
   a. Grabber Acoustical Sealant GSC
   b. STI SpecSeal Smoke N Sound Caulk
   c. BOSS 824 Acoustical Sound Sealant

B. Firestopping

1. Conform to ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
2. Products/Manufacturer
   a. STI SpecSeal SSP Putty Pads
   b. BOSS 818 Fire Rated Putty Pads

C. Fasteners for use with 5/8 inch thick tile backer panels: As recommended by Manufacturer.

D. Fasteners for use with Cement Board:

1. PermaBase Cement Board Hi-Lo thread screws (No. 8).
2. Wafer head, corrosion-resistant.
3. Overall Thickness: As recommended by Manufacturer.
4. For use with wood framing and complying with ASTM C 1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

E. Joint Treatment

1. Tape - As recommended by Manufacturer:
   a. Paper Tape: 2-1/16 inches wide.
   b. Paper Tape: 2 inches wide with metal strips laminated along the center crease to form inside and outside corners.
   c. Fiberglass Tape: Nominal 2 inches wide self adhering tape.
   d. Alkali-resistant Fiberglass Tape: Nominal 2 inches wide polymer coated alkali-resistant mesh tape.
2. Drying Type Compound - As recommended by Manufacturer:
   a. Ready Mix vinyl base compound.
   b. Ready Mix vinyl base compound formulated for enhanced mold and mildew resistance.
   c. Ready Mix vinyl base compound formulated to reduce airborne dust during sanding.
   d. Ready Mix vinyl base topping compound for finish coating.
   e. Ready Mix vinyl base compound for embedding joint tape, corner beads or other accessories.
   f. Field Mix vinyl base compound.

3. Setting Compound - As recommended by Manufacturer:
    a. Field mixed hardening compound.
    b. Field mixed hardening compound for fire resistance rated construction and penetrations.
4. Joint Sealant: Conform to ASTM C920 Standard Specification for Elastomeric Joint Sealants.
5. Finish Level: Provide a Level 4 Finish, with a light orange-peel texture. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compounds shall be smooth and free from tool marks and ridges. The prepared surface shall be coated with Sheet Rock Brand First Coat Primer, or equal, prior to the application of the light orange-peel texture.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive gypsum products to verify conditions.

B. Report conditions contrary to contract requirements that would prevent a proper installation.

C. Do not proceed with the installation until unsatisfactory conditions have been corrected.

D. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the conditions.

E. Installation indicates acceptance of the conditions with regard to conditions existing at the time of installation.

3.02 INSTALLATION, ABUSE RESISTANT GYPSUM BOARD

Install in accordance with manufacturer recommendations

3.03 INSTALLATION, CEMENT BOARD

Install in accordance w/manufacturer recommendation and ANSI A108.11

3.04 INSTALLATION, TILE BACKER

A. General:
    1. Install in accordance with manufacturer recommendations, ASTM C840 and GA-216
    2. Install with acrylic coated water barrier side facing away from the framing, so that finishes shall be applied to the coated side.
    3. Caulk or seal penetrations and abutments to dissimilar materials.

B. Tile Backer Installation for walls:
    1. Install panels horizontal or vertical to supports spaced a maximum of 16 inches on center without blocking or 24 inches on center with blocking at all joints for ½ inch thick panels and 24 inches on center for 5/8” inch thick panels.
    2. Space fasteners 8 inches on center along all support members. Drive fasteners flush with the panel surface, do not countersink.
    3. Dry Non-Tile Applications
        a. Tape joints with fiberglass mesh tape and embed with setting type joint compound.
        b. Skim the surface with a setting or ready-mix joint compound.

4. Wet Non-Tile Applications

    a. Finish walls with a direct applied finish systems, or materials suitable for humid environments.

    b. Seal transitions and abutments to dissimilar materials with flexible joint sealant.

END OF SECTION

SECTION 09510 - ACOUSTICAL CEILING SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Acoustical ceiling panels.

B. Exposed grid suspension system.

C. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

B. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

1.03 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.

a. Flame Spread: 25 or less

b. Smoke Developed: 50 or less

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.04 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.05 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

C. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

D. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.

E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

F. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.07 PROJECT CONDITIONS

A. All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions.

B. Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.

1.08 MAINTENANCE

Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.10 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports: None required.

B. As-Builts: Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data: None required

D. Extra Materials: See 1.09 for Information.

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

1. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.

2. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:

   a. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.

   b. Grid System: Rusting and manufacturer's defects

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Ceiling Panels: Armstrong World Industries, Inc. or approved equal.

2.02 ACOUSTICAL CEILING UNITS

A. Acoustical Panels

1. Surface Texture: Fine
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 3/4in
5. Edge Profile: Beveled Tegular
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.70.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
8. Emissions Testing: Section 01350 Protocol, < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Class A (UL)
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.90.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
13. Acceptable Product: Ultima 1952 as manufactured by Armstrong World Industries.

2.03 SUSPENSION SYSTEMS

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A 653. Main beams and cross tees are double-web steel construction with 9/16 IN type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

    1. Structural Classification: ASTM C 635 HD.
    2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
    3. Acceptable Product: Suprafine XL 9/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

E. Accessories

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

D. Correct conditions detrimental to timely and proper completion of the Work

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

    1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.03 INSTALLATION

A. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

B. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

D. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

E. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.04 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

1. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.

C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09650 - VINYL COMPOSITION TILE FLOORING

PART 1 – GENERAL

1.01 SECTION INCLUDES

Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

A. Select an installer who is competent in the installation of Armstrong resilient tile flooring.

B. Provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

C. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Product data on specified products, describing physical and performance characteristics: sizes, patterns, colors available, and method of installation.
2. Samples illustrating color and pattern for each material specified if substituting from color board.
3. Manufacturer's installation instructions. When approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on this Work.
4. Results of compliance of Flooring Substrate for requirements of Moisture & PH Testing prior to installation – see Item 3.01.B & C.

1.05 ENVIRONMENTAL CONDITIONS

A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

C. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of 100ºF (38ºC) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

D. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over

concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

1.06 PRODUCT HANDLING

N/A

1.07 OPERATION AND MAINTENANCE DATA

Submit operation and maintenance data maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and sealing.

1.08 CLOSE-OUT: EXTRA MATERIALS

Provide a minimum of 5% of each color specified, but not less than one box of each color specified.

1.09 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

None required.

C. Operation and Maintenance Data:

See 1.08 for Information.

D. Extra Materials:

See 1.09 for Information.

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

PART 2 - PRODUCTS

2.01 RESILIENT TILE FLOORING MATERIALS

A. Manufacturer: Armstrong World Industries, Inc

B. Thickness: 1/8"

C. Type/Size/Color: As indicated on the Drawings.

D. Tile shall be composed of polyvinyl chloride resin binder, plasticizers, fillers, and pigments with colors and texture dispersed uniformly throughout its thickness. Vinyl composition tile shall conform to the requirements of ASTM F 1066, Class 2 – through pattern.

2.02 ADHESIVES

For Tile Installation System, Full Spread: Provide Armstrong S-515 Resilient Tile Adhesive under the tile as recommended by the flooring manufacturer.

2.04 ACCESSORIES

A. For patching, smoothing, and leveling monolithic subfloors (concrete), provide Armstrong S-183 Fast-Setting Cement-Based Underlayment.

B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. Provide transition/reducing strips tapered to meet abutting materials.

D. Provide threshold of thickness and width as shown on the drawings.

E. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

F. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

B. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

C. Perform subfloor moisture testing in accordance with the Manufacturer's requirements. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D. Perform pH tests on concrete floors regardless of their age or grade level. PH level shall not exceed range of 5 to 9. All test results shall be documented and retained.

E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 PREPARATION

A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with Armstrong [S-183 Fast-Setting Cement-Based Underlayment][S-184 Fast-Setting Cement-Based Patch and Skim Coat][S-194 Fast-Setting Cement-Based Patch and Underlayment] as recommended by the flooring manufacturer.

B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.

C. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.03 INSTALLATION OF TILE FLOORING

A. Install flooring in strict accordance with the latest edition of "Armstrong Guaranteed Installation System", F-5061.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and

to covers.

D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.

E. 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.

3.04 INSTALLATION OF ACCESSORIES

A. Apply butt-edge metal edge strips where shown on the drawings, after flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

B. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

A. Perform initial maintenance according to the latest edition of "Armstrong Guaranteed Installation System," F-5061.

B. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings. (See Finishing The Job in "Armstrong Guaranteed Installation System," F-5061.)

END OF SECTION

SECTION 09653 - RUBBER WALL BASE

PART 1 – GENERAL

1.01 SUMMARY

Wall Base and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

A. Select an installer who is competent in the installation of Burke Rubber Wall Base.

B. Provide rubber wall base, adhesives and any accessories supplied by one manufacturer.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Product data on specified products, describing physical and performance characteristics: sizes, patterns, colors available, and method of installation.
2. Samples illustrating color and pattern for each material specified if substituting from color board.
3. Manufacturer's installation instructions. When approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on this Work.

1.05 PRODUCT HANDLING

N/A

1.06 JOB SITE CONDITIONS

A. Maintain a minimum temperature in the spaces to receive the wall base and accessories of 65ºF (18ºC) and a maximum temperature of [100ºF (38ºC)] [85ºF (29ºC) for Epoxy Adhesive] for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

B. Install wall base and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation. Install in accordance with the manufacturer's recommendations.

1.07 OPERATION AND MAINTENANCE DATA

Submit operation and maintenance data maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.08 CLOSE-OUT: EXTRA MATERIALS

Provide 5% of each color specified.

1.09 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

See 1.09 for Information.

D. Extra Materials:

See 1.10 for Information.

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

PART 2 – PRODUCTS

2.01 RESILIENT RUBBER WALL BASE

A. Manufacturers: As indicated on the drawings

B. Products: As indicated on the drawings.

C. Physical Characteristics: thermoplastic rubber formulation designed specifically to meet the performance and dimensional requirements of ASTM F-1861, Type TP, Group 1, Standard Specification for Resilient Wall Base.

D. Hardness - ASTM D 2240: 85 Shore A

E. Meets or exceeds the performance requirements for resistance to heat/light aging, chemicals, and dimensional stability when tested to the methods, as described, in ASTM F-1861 Standard Specification for Resilient Wall Base.

F. Fire Resistance: ASTM E648/NFPA 253 (Critical Radiant Heat Flux) - Class I

G. Size, Thickness, and Color: As indicated on the Drawings.

2.02 ADHESIVES

A. Porous Surfaces: as recommended by the manufacturer.

B. Non-porous Surfaces: Use a good quality contact bond adhesive and apply per manufacturer's instructions

C. Apply adhesives as recommended by the flooring manufacturer.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine area 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 material.

B. Inspect substrate prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

C. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

D. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor.

E. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 INSTALLATION OF FLOORING

A. Installation Manual: Refer to Burke Profiles Resilient Wall Base Installation instructions for complete installation details.

B. The installation of Burke Profiles Resilient Rubber Wall Base should not begin until the work of all other trades has been completed, especially overhead trades.

C. Areas to receive wall base shall be clean, fully enclosed, weathertight, and maintained at a uniform temperature of at least 65^0 F for 24 hours before, during, and after the installation is completed. The wall base and adhesives shall be conditioned in the same manner. The wall surface shall be clean, dry, free of dust, all paints, wallpaper, and all other foreign material, which may affect proper adhesive bonding.

D. Wall Base may be installed on interior plaster, gypsum wallboard, concrete, masonry, mineral-reinforced cement board or similar porous surfaces.

E. Wall Base shall not be installed on surfaces that will be exposed to drastic temperature changes or moisture.

F. Cut the wall base to finished length or miter cut the ends for inside and outside corners utilizing a standard compound or sliding miter saw, table saw or radial arm saw equipped with a tungsten carbide or diamond-tipped saw blade with 60 teeth or greater.

G. Mitered inside and outside corners can be glued together prior to installation to provide a tighter fit at the corner using contact bond adhesive.

END OF SECTION

SECTION 09680 - CARPET

PART 1 -- GENERAL

1.01 SCOPE OF WORK

Furnish all Materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to comply with the Contract Documents, including, but not limited to, these major items:

1. Direct glue down carpet with backing.
2. Metal edge trim and backing for carpet coved wall base if indicated on the drawings.

1.02 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.03 SUBMITTALS

A. .Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Product data on specified products, describing physical and performance characteristics: sizes, patterns, colors available, and method of installation.
2. Samples illustrating color and pattern for each carpet material specified if substituting from color board.
3. Manufacturer's installation instructions. When approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on this Work.
4. Results of compliance of Flooring Substrate for requirements of Testing prior to installation – See Item 3.01.D.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.

B. Maintain minimum 72 degrees F ambient temperature plus/minus 5 degrees with relative humidity not exceeding 65% three days prior to, during, and 72 hours after installation of materials.

1.05 OPERATION AND MAINTENANCE DATA

Submit operation and maintenance data maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.

1.06 CLOSE-OUT: EXTRA MATERIALS

Provide 5% of carpeting of each color specified.

1.07 PRODUCT HANDLING

N/A

1.09 CLOSE-OUT: Comply with the requirements of Section 01700 – PRoject Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

See 1.06 for Information.

D. Extra Materials:

See 1.07 for Information.

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

PART 2 -- PRODUCTS

2.01 CARPET

Manufacturer(s), Type(s), Location(s), Color(s), and Pattern(s) as indicated on drawings.

2.02 FLOOR BASE

Manufacturer(s), Type(s), Location(s), Finishes(s), as indicated on drawings.

2.03 FLOORING TRANSITIONS

Manufacturer(s), Type(s), Location(s), Finishes(s), as indicated on drawings.

2.04 OTHER ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by carpet manufacturer.

B. Primers and Adhesives: Waterproof; of types recommended by carpet manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Verify that substrate surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft. and are ready to receive work. Have all previous adhesives removed.

D. Concrete Slab Testing:

1. Alkalinity: Test the concrete for alkalinity prior to beginning the installation. Check the concrete for surface pH at several locations. A reading below 5.0 or above 9.0 requires corrective measures. Specific information on the correct method of neutralizing low or high pH is available through Shaw Technical Services Department.

2. Moisture: Check the concrete for moisture at several locations using the anhydrous calcium test kits. The moisture transmission rate must not exceed 5.0 pounds per 1000 square-feet per 24-hours. Do not begin the installation if an unacceptable moisture level is detected. Do not use other methods of moisture testing as they are not reliable. If excessive moisture is present, advise the Construction Manager.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to leave smooth, flat, hard surface.

C. Prohibit traffic until filler is cured.

D. Vacuum floor surface.

3.03 INSTALLATION

A. Apply carpet and adhesive in accordance with manufacturers' instructions. Direct glue-down.

B. Lay out rolls of carpet.

C. Verify carpet match before cutting to ensure minimal variation between dye lots.

D. Locate seams in area of least traffic. Carpet shall be installed in full lengths wherever possible.

E. Fit seams straight, not crowded or peaked, free of gaps.

F. Lay carpet on floors with run of pile in same direction as anticipated traffic. Lay carpet so that seams perpendicular to a wall do not occur at door openings in that wall.

G. Do not change 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.

I. Fit carpet tight to intersection with vertical surfaces without gaps.

J. All seams shall be beaded and sealed with "seam sealer". The seam sealer shall be applied to the cut edge of the carpet at the level of the carpet backing.

K. No stretching will be permitted.

L. Unroll carpet face up and cut the lengths required with pile-lay runs in the same direction. Check starting wall for squareness and allow for off-square walls. Strike chalk line the entire length of area where seam falls.

M. Place two lengths in proper position for installing; trim salvage, and line up seam edge with chalk line. Lay carpet perfectly flat and tension free.

N. Roll both widths back 3' from seam area the entire length of carpet.

O. Spread adhesive from approximate center towards each end.

P. When sufficient floor area has been covered with adhesive, drop or roll first width into place. Apply coating of edge sealer to seam edge of first width. Follow this procedure on each succeeding width at seam. Drop or roll second width into position and fit the seam in tightly using knee-kicker if necessary. Brush or roll looseness and air bubbles away from seam.

Q. Fold or roll the remaining portion of the first width from the wall. Apply adhesive to the floor and drop or roll carpet into place.

R. Roll or fold back dry portion of second width towards seam; spread adhesive and place carpet 3' from where next seam will fall.

S. Brush or roll out looseness and air bubbles as carpet is put into place. Repeat above procedure on continuing widths. Trim carpet at wall using razor blade knife or suitable wall trimmer.

3.04 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean and vacuum carpet surfaces.

3.05 PROTECTION

A. Prohibit traffic from carpet areas for 24 hours after installation.

B. Cover with non-staining building paper, firmly fastened down to protect floor surfaces.

C. Near completion of the project, remove paper, clean and vacuum carpet.

END OF SECTION

SECTION 09770 - FRP - GLASS FIBER REINFORCED PLASTIC PANELING

PART 1 – GENERAL

1.01 SUMMARY

Section Includes: Fiberglass reinforced plastic (FRP) paneling for wall and ceiling surfaces, including trim accessories.

1.02 REFERENCES

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

1. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
2. ASTM D5319 – Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
3. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Factory Mutual FM:

1. FM Approval 4880 - Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior; Wall Systems.

D. Crane Composites (Inspired by Kemlite):

1. Installation Guide for FRP Panels #6876.

1.03 QUALITY ASSURANCE

A. Pre-installation Meetings: Conduct pre-installation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

B. Surface-Burning Characteristics: Determined by testing identical products according to ASTM E84 by a testing agency acceptable to authorities having jurisdiction.

1. Flame-Spread Index: 25 (Class A) or less.
2. Smoke-Developed Index: 450 or less.

C. FMRC (Factory Mutual Research Corporation) Approval: Fire-X Glasbord FM.

1.04 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.05 SUBMITTALS

A. in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Manufacturer Qualifications: Provider of installer training.

C. Installer Qualifications:

1. At least five years experience in the installation of fiberglass reinforced plastic panels.
2. Experience on at least five projects of similar size, type and complexity as this Project.
3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated.

D. Product Technical Data: For each type of product required.

E. Mock-Ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner and Architect approval and acceptance of finish color, texture, pattern, trim, fasteners and quality of installation.

1. Mock-Up Size: one wall (8-foot minimum width).
2. Incorporation: Mock-up may be incorporated into final construction upon Owner approval.

1.06 PRODUCT HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package sheets on skids or pallets for shipment to project site.

B. Storage and Handling: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store panels in a dry indoor location at Project site. Remove any foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

1.07 PROJECT CONDITIONS

A. Do not begin installation until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.

B. During installation, and within 48 hours prior to installation, maintain ambient temperature and relative humidity within limits required by type of panel adhesive used and recommendation of panel adhesive manufacturer

1.09 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

1. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
2. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace FRP panels that fail within specified warranty period.

A. Failures shall include, but not be limited to substantial defects in material and workmanship, rotting, rusting, corrosion, development of structural surface cracks, or requiring painting or refinishing.

B. Warranty Period: Ten years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

A. Basis of Design Product: Subject to compliance with requirements provide Crane Composites, Inc.

B. General: Fiberglass reinforced plastic panels complying with ASTM D5319.

C. Low-Emitting Materials: Comply with testing and product requirements of California Department of Health Services standards for Volatile Organic Emissions

D. Nominal Thickness: 0.12 inch

E. Panel Type, Panel Sizes, Surface Finish, and Color: As indicated on the Drawings.

F. Performance Criteria:

1. Scratch Resistance: ASTM D2583 (Barcol Hardness Test according to Panel Type indicated on the Drawings).

2. Abrasion Resistance: Taber Abrasion Test using CS-17 abrasive wheels with 1000 g weight. Panels shall exhibit weight loss after 25 cycles of no more than 0.038 percent.

3. Impact Strength: ASTM D5420 (according to Panel Type indicated on the Drawings) showing no visible damage on finish side.

2.02 ACCESSORIES

A. Moldings, Trim and Caps: One-piece extruded polypropylene or PVC, configured to cover panel edges and corners. Color to match panel.

B. Panel Adhesive: As recommended by panel manufacturer for the required substrates.

C. Panel Sealant: As recommended by panel manufacturer.

2.03 SOURCE QUALITY CONTROL

Obtain fiberglass reinforced panels, moldings and other accessories from a single manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

A. General: Comply with manufacturer's product data, including product technical bulletins, and installation instructions in product catalogs and product packaging.

B. Verify that substrates previously installed under other sections are acceptable for product installation in accordance with FRP manufacturer's instructions.

C. Examine substrate surfaces to determine that corners are plumb and straight, that surfaces are smooth, sound and uniform, that nails or screw fasteners are countersunk, and that joints and cracks are filled flush and smooth with adjoining surfaces.

D. Do not begin panel installation until substrate surfaces are in satisfactory condition.

3.02 PREPARATION

A. Clean substrates to remove substances that could impair bond of adhesive, including oil, grease, dirt, dust or other contamination.

B. Condition panels by unpacking and placing in installation space no less than 24 hours before installation.

C. Lay out paneling before beginning installation. Locate panel joints to provide equal panel widths at ends of walls and so that trimmed panels at corners are not less than 12 inches (300 mm) wide.

3.03 INSTALLATION

A. General: Comply with panel manufacturer's Installation Guide #6876.

B. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.

C. Install panels with manufacturer's recommended gap for panel field and corner joints.

1. Pre-drill fastener holes in panels, 1/8 inch (3.2 mm) greater in diameter than fastener.

2. Install panels in a full spread of adhesive. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.

D. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

E. Sealant:

1. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

2. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths.

3.05 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.

D. Remove and lawfully dispose of construction debris from project site.

3.06 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

SECTION 09900 - PAINTING

PARTS 1 -- GENERAL

1.01 SUMMARY:

A. Section Includes: Painting and finishing of all interior and exterior items and surfaces, unless otherwise indicated or listed under exclusions below:

1. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated.
2. Include field painting of exposed exterior and interior structural steel, plumbing, mechanical and electrical work, except as indicated below.
3. Paint exterior plaster where indicated on Drawings.

B. Work Included:

1. The intent and requirements of this section is that all work, items and surfaces which are normally painted and finished in a building of this type and quality, shall be so included in this contract, whether or not said work, item or surface is specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.
2. All the requirements of Division Zero and Division One apply to this Section.

C. The following general categories of work and items that are included under other sections, shall not be a part of this section:

1. Shop prime painting of structural and miscellaneous iron or steel.
2. Shop prime painting of hollow metal work.
3. Shop finished work and items.
4. Any drywall or plaster permanently concealed from view.
5. Any factory finished equipment and other materials with a complete factory applied finish.
6. Finish hardware except where primed for paint finish.
7. Any glass, plastics, floor tiles and sheet vinyl coved or vinyl top set bases.
8. Plumbing fixtures: Toilet room accessories.
9. Lighting fixtures except as noted on drawings or specified.
10. Any acoustical surfaces; unless otherwise specified.

D. The Room Finish Schedules indicated on the drawings, indicates the location of interior room surfaces to be painted or finished. The schedule indications are general and do not necessarily define the detail requirements. Include all detailed refinements and further instructions as may be given for the required complete finishing of all spaces and rooms.

1.02 SUBSTITUTIONS

will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.03 SUBMITTALS:

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in compliance with Section 01300 – Contractor Submittals of the Specifications.

1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable. When required, provide a list of paint and coating materials proposed for use, which equates such materials with the design-basis products specified.

B. Samples: In accordance with provisions of Article 5 of the General Conditions, submit, on 8-1/2 inch by 11 inch hardboard, samples of each color, gloss, texture and material selected by the Architect from standard colors available for the coatings required.

1. For natural and stained finishes, provide sample on each type and quality of wood used on the project.

C. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.

1.04 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to job going out to bid and before start of painting project.

1. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

B. Field Sample: When and as directed by the Architect, apply one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Work and will serve as the standards by which the subsequent Work of this Section will be judged.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

B. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name and trade name. Store where directed in accordance with manufacturer's instructions.

1.06 PROJECT CONDITIONS:

Do not apply exterior materials during fog, rain or mist, or when inclement weather is expected within the dry time specified by the manufacturer. No exterior or interior painting shall be done until the surfaces are thoroughly dry and cured. Do not apply paint when temperature is below 50° F. Avoid painting surfaces when exposed to direct sunlight.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS:

Manufacturer's catalog names and number of paint types in this Section herein are based on products of Dunn-Edwards Corporation and is the standard of quality against which the Architect will judge equivalency. The quantity of titanium dioxide, the use of clays, aluminum silicate, talc and the purity of acrylic materials are a few of the criteria which will be used by the Architect in determining equivalency of materials. Paints of other manufacturers to conform to materials listed and are approved by Architect.

2.02 MATERIALS:

A. Paints: Provide Ready-Mixed, except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks and sags.

B. Accessory Materials: Linseed oil, shellac, solvents, and other materials not specified but required to achieve required finishes shall be of high quality and approved by manufacturer.

C. Colors shall be selected from color chip samples provided by manufacturer of paint system approved for use. Match approved samples for color, texture and coverage.

2.03 MIXES:

Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

PART 3 -- EXECUTION

3.01 EXAMINATION:

A. Examine the areas and conditions under which work of this Section will be performed.

B. Examine surfaces to be painted before beginning painting work. Work of other trades that has been left or installed in a condition not suitable to receive paint, stain, other specified finish shall be repaired or corrected by the applicable trade before painting. Painting of defective or unsuitable surface implies acceptance of the surfaces.

C. Beware of a condition known as "critical lighting". This condition causes shadows that accentuate even the slightest surface variations. A pigmented sealer will provide tooth for succeeding decorative coating, but "does not" equalize smoothness or surface texture. Any corrective action to gypsum board/drywall must be done by the drywall contractor prior to decorating.

D. Correct conditions detrimental to timely and proper completion of the Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of conditions.

3.02 PROTECTION:

A. Protect previously installed work and materials, which may be affected by Work of this Section.

a. Protect prefinished surfaces, lawns, shrubbery and adjacent surfaces against paint and damage.

b. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.

c. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.

B. Provide WET PAINT signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.03 PREPARATION:

A. Perform preparation and cleaning procedures in strict accordance with coating manufacturer’s instructions for each substrate condition.

B. Concrete and masonry surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.

C. Ferrous metal shall be cleaned of oil, grease, and foreign matter with solvent. Prime within 3 hours after preparation.

D. Sand and scrape metal to remove loose primer and rust.

E. Galvanized metal shall be chemically or solvent cleaned and then retreated with an etching-type solution if recommended by the finish manufacturer. Cleaned and retreated galvanized metal shall be primed the same day that cleaning has been performed.

F. Remove dust, grit and foreign matter from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

G. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.

H. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

I. Thoroughly backpaint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Backpaint items to be painted or enameled with the priming coat. Use a clear sealer for backpriming where transparent finish is required.

J. Bar and covered pipes, ducts, hangers, exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.

K. Preparation of other surfaces shall be performed following specific recommendations of the coatings manufacturer.

L. Bond breakers and curing agents must be removed and the surface cleaned before primers, sealers or finish paints can be applied.

M. All drywall surfaces must be completely dry and dust free before painting. Skim coated drywall must be sealed with an alkyd based sealer or a waterborne sealer recommended by the paint manufacturer for this surface. Use the appropriate light or medium tack masking tape.

3.04 APPLICATION:

A. Apply painting and finishing materials in accordance with the manufacturer's submittals, as approved. Use applicators and techniques best suited for the material and surfaces to which applied.

1. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.

2. All undercoats shall be tinted slightly to approximate the color of the finish coat.

B. Apply each material at not less than the manufacturer's recommended spreading rate:

1. Provide a total dry film thickness of not less than 1.2 mils for each required coat.

C. Apply prime coat to surface, which is required to be painted or finished.

D. Finish exterior doors on tops, bottoms, and edges same as exterior faces, after fitting.

E. Sand lightly and dust clean between succeeding coats.

3.05 CLEANING, TOUCH-UP AND REFINISHING:

A. Carefully remove all spattering, spots and blemishes caused by work under this section from surfaces throughout the project.

B. Upon completion of painting work remove all rubbish, paint cans, and accumulated materials resulting from work in each space or room. All areas shall be left in a clean, orderly condition.

C. Runs, sags, misses, holidays, stains and other defects in the painted surfaces, including inadequate coverage and mil thickness shall be satisfactorily touched up, or refinished, or repainted as necessary.

3.06 FINISH SCHEDULE

A. Apply the following finishes to the surfaces specified and/or as on the finish schedule on the Drawings. Apply all materials in accordance with manufacturer's instructions on properly prepared surfaces and foundation coats. All intermediate undercoats must be tinted to approximate the final color.

1. Architect will issue a color schedule prior to start of painting to designate the various colors and locations required for the work.

B. Exterior Systems:

1. Stucco & Plaster

Flat – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709) OR SUPER-LOC Two Component Waterborne Epoxy Masonry Sealer (W 718)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)

2. Concrete Tilt-Up

Flat – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer/Sealer (W 709) OR SUPER-LOC Two Component Waterborne Epoxy Masonry Sealer (W 718)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)

3. Brick Masonry

Flat – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer/Sealer (W 709) OR SUPER-LOC, Two Component Waterborne Epoxy Masonry Sealer (W 718)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)

4. Concrete Block

a. Flat – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)

b. Semi-Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)
Third Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)

c. Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)
Third Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)

d. High Gloss, High Performance – Acrylic/Urethane

First Coat	RUST-OLEUM SIERRA GRIPTEC S30 Primer
Second Coat	RUST-OLEUM SIERRA BEYOND Multi-Purpose Acrylic Enamel
Third Coat	RUST-OLEUM SIERRA BEYOND Multi-Purpose Acrylic Enamel

5. Ferrous Metal

a. Flat – Alkyd/Acrylic

First Coat	BLOC-RUST, Red Oxide Alkyd Rust Preventative Primer (43-4)
OR	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701V)

b. Semi-Gloss – Alkyd/Acrylic

First Coat	BLOC-RUST, Red Oxide Alkyd Rust Preventative Primer (43-4)
OR	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	PERMASHEEN, Int/Ext. 100% Acrylic Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Int/Ext. 100% Acrylic Semi-Gloss Enamel (W 901V)

c. Gloss – Alkyd/Acrylic

First Coat	BLOC-RUST, Red Oxide Alkyd Rust Preventative Primer (43-4)
OR	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W960V)

Third Coat PERMAGLOSS, 100% Acrylic Gloss Enamel (W960V)

d. Gloss – Rust Preventative Alkyd

First Coat SYN-LUSTRO Rust-Preventative Acrylic Primer (W8)
Second Coat SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10)
Third Coat SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10)

e. Matte, Industrial High Performance – Inorganic Zinc/Epoxy/Acrylic

First Coat CARBOLINE CARBOZINC 859 VOC
Second Coat CARBOLINE CARBOGUARD 890 VOC
Third Coat CARBOLINE CARBOCRYLIC 3359 MC

f. Matte, Industrial High Performance – Epoxy Primer/Epoxy/Acrylic

First Coat CARBOLINE CARBOGUARD 890 VOC
Second Coat CARBOLINE CARBOGUARD 890 VOC
Third Coat CARBOLINE CARBOCRYLIC 3359 MC

g. High Gloss, Industrial High Performance – Inorganic Zinc/Epoxy/Urethane

First Coat CARBOLINE CARBOZINC 859 VOC
Second Coat CARBOLINE CARBOGUARD 890 VOC
Third Coat CARBOLINE CARBOTHANE 134 VOC

h. High Gloss, Industrial High Performance – Epoxy Primer/Epoxy/Urethane

First Coat CARBOLINE CARBOGUARD 890 VOC
Second Coat CARBOLINE CARBOGUARD 890 VOC
Third Coat CARBOLINE CARBOTHANE 134 VOC

6. Galvanized Metal

a. Flat – Alkyd/Acrylic

Pretreatment GALVA-ETCH, Etching Liquid (GE 123)
First Coat GALV-ALUM Epoxy Galvanized/Aluminum Metal Primer (43-7)
Second Coat EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
Third Coat EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)

b. Semi-Gloss – Alkyd/Acrylic

Pretreatment GALVA-ETCH, Etching Liquid (GE 123)
First Coat GALV-ALUM Epoxy Galvanized/Aluminum Metal Primer (43-7)
Second Coat PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)
Third Coat PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)

c. Gloss – Alkyd/Acrylic

Pretreatment GALVA-ETCH, Etching Liquid (GE 123)
First Coat GALV-ALUM Epoxy Galvanized/Aluminum Metal Primer (43-7)
Second Coat PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)
Third Coat PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)

d. Gloss – Rust Preventative Alkyd

Pretreatment	GALVA-ETCH, Etching Liquid (GE 123)
First Coat	SYN-LUSTRO Rust-Preventative Acrylic Primer (W8)
Second Coat	SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10)
Third Coat	SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10)

e. Matte, Industrial High Performance – Epoxy Primer/Acrylic

First Coat	CARBOLINE CARBOGUIDE 890 VOC
Second Coat	CARBOLINE CARBOCRYLIC 3359 MC
Third Coat	CARBOLINE CARBOCRYLIC 3359 MC

f. High Gloss, Industrial High Performance – Epoxy Primer/Urethane

First Coat	CARBOLINE CRABOGUARD 890 VOC
Second Coat	CARBOLINE CARBOTHANE 134 VOC
Third Coat	CARBOLINE CARBOTHANE 134 VOC

7. Wood – Paint Finish

a. Semi-Gloss – Acrylic

First Coat	E-Z PRIME, Ext. 100% Acrylic Wood Primer (W 708)
Second Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)
Third Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)

b. Gloss – Acrylic

First Coat	E-Z PRIME, Ext. 100% Acrylic Wood Primer (W 708)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)
Third Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)

8. Wood – Stain Finish – Opaque:

Two Coats	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704V)

9. Wood – Stain Finish – Semi-Transparent:

One Coat	OKON Weather Pro Tinted (WPT-3)

C. Interior Systems:

1. Gypsum Board

a. Flat - Acrylic

First Coat	VINYLASTIC, Interior Pigmented Sealer (W 101)*
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)

b. Low Sheen – Acrylic

First Coat	VINYLASTIC, Interior Pigmented Sealer (W 101V)*
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411V)
Third Coat	SUPREMA, Latex Low Sheen Enamel (W411V)

c. Eggshell – Acrylic

First Coat	VINYLASTIC, Interior Pigmented Sealer (W 101V)*
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss - Acrylic

First Coat	VINYLASTIC, Interior Pigmented Sealer (W 101**V**)*
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – Acrylic

First Coat	VINYLASTIC, Interior Pigmented Sealer (W 101**V**)*
Second Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W901V)
Third Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W901V)

f. Gloss– Industrial High Performance – Waterborne Epoxy

First Coat	RUST-OLEUM SIERRA S70 Industrial Epoxy Primer
Second Coat	RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel
Third Coat	RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel

g. High Gloss – Industrial High Performance – Waterborne Epoxy/Urethane

First Coat	CARBOLINE CARBOGUARD 890 VOC
Second Coat	CARBOLINE CARBOTHANE 134 VOC
Third Coat	CARBOLINE CARBOTHANE 134 VOC

2. Concrete & Plaster:

a. Flat – Acrylic Copolymer

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)

b. Low Sheen – Acrylic Copolymer

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411V)
Third Coat	SUPREMA, Latex Low Gloss Enamel (W 411V)

c. Eggshell – 100% Acrylic

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)

OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – 100% Acrylic

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)

f. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	RUST-OLEUM SIERRA S70 Industrial Epoxy Primer
Second Coat	RUST-OLEUM SIERRA S50 Industrial Gloss Enamel
Third Coat	RUST-OLEUM SIERRA S50 Industrial Gloss Enamel

g. High Gloss- Industrial High Performance - Epoxy/Urethane

First Coat	CARBOLINE CARBOGUARD 890 VOC
Second Coat	CARBOLINE CARBOTHANE 134 VOC
Third Coat	CARBOLINE CARBOTHANE 134 VOC

3. Brick

a. Flat – Acrylic Copolymer

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)

b. Low Sheen – Acrylic Copolymer

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411V)
Third Coat	SUPREMA, Latex Low Sheen Enamel (W411V)

c. Eggshell – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)

f. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	RUST-OLEUM SIERRA S70 Industrial Epoxy Primer
Second Coat	RUST-OLEUM SIERRA S50 Industrial Gloss Enamel
Third Coat	RUST-OLEUM SIERRA S50 Industrial Gloss Enamel

g. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	RUST-OLEUM SIERRA S70 Industrial Epoxy Primer
Second Coat	RUST-OLEUM SIERRA S50 Industrial Gloss Enamel
Third Coat	RUST-OLEUM SIERRA S50 Industrial Gloss Enamel

h. High Gloss- Industrial High Performance - Epoxy/Urethane

First Coat	CARBOLINE CARBOGUARD 890 VOC
Second Coat	CARBOLINE CARBOTHANE 134 VOC
Third Coat	CARCOLINE CARBOTHANE 134 VOC

4. Concrete Block

a. Flat – Acrylic Copolymer

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)

b. Low Sheen – Acrylic Copolymer

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411V)
Third Coat	SUPREMA, Latex Low Sheen Enamel (W411V)

c. Eggshell – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMAGLOSS, Acrylic Int. Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic Int. Gloss Enamel (W960V)

f. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel
Third Coat	RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel

g. High Gloss- Industrial High Performance – Acrylic/Urethane

First Coat	CARBOLINE SANITILE 100
Second Coat	CARBOLINE CARBOTHANE 134 VOC
Third Coat	CARBOLINE CARBOTHANE 134 VOC

5. Ferrous Metal

a. Flat – Acrylic Copolymer

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)

b. Low Sheen – Alkyd/Acrylic Copolymer

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411V)
Third Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411V)

c. Eggshell – Alkyd/100% Acrylic

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – Alkyd/100% Acrylic

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)

e. Semi-Gloss –Rust Preventative Alkyd

First Coat	SYN-LUSTRO W8 Rust-Preventative Acrylic Primer
Second Coat	SYN-LUSTRO, W9 Rust-Preventative Acrylic Semi-Gloss Enamel
Third Coat	SYN-LUSTRO, W9 Rust-Preventative Acrylic Semi-Gloss Enamel

f. Gloss – Alkyd/100% Acrylic

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	PERMAGLOSS, Acrylic Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic Gloss Enamel (W960V)

g. Gloss –Rust Preventative Alkyd

First Coat	SYN-LUSTRO W8 Rust-Preventative Acrylic Primer
Second Coat	SYN-LUSTRO, W10 Rust-Preventative Acrylic Gloss Enamel
Third Coat	SYN-LUSTRO, W10 Rust-Preventative Acrylic Gloss Enamel

h. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	RUST-OLEUM SIERRA S70 Industrial Epoxy Primer
Second Coat	RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel
Third Coat	RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel

i. High Gloss – Industrial High Performance - Epoxy/Urethane

First Coat	CARBOLINE CARBOGUARD 890 VOC
Second Coat	CARBOLINE CARBOTHANE 134 VOC
Third Coat	CARBOLINE CARBOTHANE 134 VOC

6. Wood – Paint Finish

a. Flat – Acrylic Copolymer

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401V)

b. Low Sheen – Alkyd/Acrylic Copolymer

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411V)
Third Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411V)

c. Eggshell – Alkyd/100% Acrylic

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)

e. Semi-Gloss – Alkyd – Class A Fire Retardant

First Coat	SUPER U-365, Int. Alkyd Enamel Undercoater (E22-1V)
Second Coat	ARISTOGLO, Int. Alkyd Semi-Gloss Fire Retardant Enamel (74)**
Third Coat	ARISTOGLO, Int. Alkyd Semi-Gloss Fire Retardant Enamel (74)**

f. Gloss – 100% Acrylic

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	PERMAGLOSS, Acrylic Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic Gloss Enamel (W960V)

7. Wood – Stain & Lacquer

a. Flat

First Coat	STAINSEAL, Interior Wiping Oil Stain V-YBQ

Filler	PASTE WOOD FILLER (PWF 2703)
Second Coat	550 CONTRACTORS EDGE High Solids Lacquer Sanding Sealer, Clear CE550PRO-SS
Third Coat	DECOLAC, High Solid Flat Lacquer, Clear N/A
Fourth Coat	DECOLAC, High Solid Flat Lacquer, Clear N/A

b. Semi-Gloss

First Coat	STAINSEAL, Interior Wiping Oil Stain V-YBQ
Filler	PASTE WOOD FILLER (PWF 2703)
Second Coat	550 CONTRACTORS EDGE High Solids Lacquer Sanding Sealer, Clear CE550PRO-SS
Third Coat	550 CONTRACTORS EDGE, High Solids Semi-Gloss Lacquer, Clear CE550PRO60
Fourth Coat	550 CONTRACTORS EDGE, High Solids Semi-Gloss Lacquer, Clear CE550PRO60

c. Gloss

First Coat OR	STAINSEAL, Interior Wiping Oil Stain V-YQB
Filler	PASTE WOOD FILLER (PWF 2703)
Second Coat	550 DECOLAC, High Solids Lacquer Sanding Sealer, Clear CE550PRO-SS
Third Coat	550 DECOLAC, High Solids Gloss Lacquer, Clear CE550PRO90
Fourth Coat	550 DECOLAC, High Solids Gloss Lacquer, Clear CE550PRO90

* Dunn-Edwards does not recommend VINYLASTIC, Interior Pigmented Sealer (W 101) on drywall where "Prep Coat", "First Coat", or other skim coat type materials have been applied. For enamel finishes, use WALLTONE, Flat Wall Finish (W 420) for the first coat. For flat finishes, use two coats of the flat finish material only.

**Yellowing of white and off-white alkyd enamels may occur because of government regulatory limits on solvent content. Substitution of latex enamels would avoid this problem, but may not provide comparable performance.

END OF SECTION

SECTION 10200 - LOUVERS

PART 1 -- GENERAL

1.01 SCOPE OF WORK

Work included: Provide metal louvers and vents as required by the Drawings, as specified herein, and as needed for a complete and proper installation. All of the requirements of the Contract Documents apply to this Section.

1.02 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods for proper performance of the work of this Section.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit the following:

1. Materials list of items that will be provided under this Section.
2. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements.
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
4. Samples of the proposed products, showing profiles, joining, and finish.

1.05 PRODUCT HANDLING

N/A

1.07 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

PART 2 -- PRODUCTS

2.01 METAL LOUVERS

A. Provide metal louvers in the arrangements and dimensions shown on the Drawings, and with the following attributes:

1. High Performance Fixed Drainage Louver, 4" deep. Frames and blades to be 6063-T5 alloy 0.081" (2.06mm) thick. Mullions to be sliding interlock type with integral internal drain. Jamb and mullion drains to be open on front face in order to direct water away from inside of louver. Blades to be one-piece extrusions with gutters designed to catch and direct water to jamb and mullion drains. Fasteners to be aluminum or stainless steel. Louvers to have framed mesh removable mill finish aluminum insect screens.

2. Finish - Kynar. 500 coating in color selected by the Architect from the manufacturer's color selections.

B. Acceptable products:

1. High Performance Fixed Drainable Louver, Model 4097 & Thinline Louver, Model 2322A, as manufactured by Construction Specialties, Inc.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify all opening dimensions in field prior to fabrication and installation of louvers.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. Install the work of this Section in strict accordance with the original design, the accepted Shop Drawings, and the manufacturer's recommended installation procedures as accepted by the Architect, anchoring all components firmly into position in true alignment within a tolerance of one in 1000 vertically and horizontally.

C. Dissimilar Materials:

1. Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or white bronze of small area, isolate the aluminum by one of the following methods:

a. Paint the dissimilar metal with a prime coat of zinc-chromate primer, followed by two coats of aluminum metal-and-masonry paint.

b. Paint the dissimilar metal with a coating of heavy-bodied bituminous paint.

c. Apply a good quality sealant material between the aluminum and the dissimilar metal.

d. Isolate the dissimilar metals with non-absorptive tape or gaskets.

3.03 CLEANING

Prior to completion of the Work, Contractor shall thoroughly clean all exposed surfaces of louvers.

A. Use only the cleaning materials and techniques recommended by the manufacturer of the material being cleaned.

B. Do not scratch or otherwise damage the finish.

END OF SECTION

SECTION 10400 - IDENTIFYING DEVICES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Molded plastic signs.

B. Aluminum free-standing signs.

C. Aluminum channel letters.

1.02 RELATED WORK

A. Documents affecting this Work include: General Conditions, Special Conditions, and Sections of Division 1 of these Specifications.

B. Reinforced masonry systems: Monument signs.

C. Wood doors.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Submit two samples illustrating full size sample sign, of type, style and color specified including method of attachment.

C. Submit manufacturer's installation instructions.

D. Include installation template and hardware.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs, labeled in name groups.

B. Store adhesive tape at ambient room temperatures.

1.06 ENVIRONMENTAL REQUIREMENTS

Do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

A. Mohawk Sign Systems: Aluminum & Plastic Signs.

B. A.R.K. Ramos Architectural Signage Systems; Aluminum Channel Letter.

C. Substitutions: Under provisions of 1.03.

2.02 MATERIALS -- ALUMINUM CHANNEL LETTERS

A. Aluminum letters: 8", 7” and 2”, Helvetica Medium.

B. Brackets: PPM-1 bracket sleeved stud.

1. Set in adhesive in masonry.

2. Attach to support in framed wall.

2.03 MATERIALS -- MOLDED PLASTIC SIGNING SYSTEM

A. 1/8" thick ES Plastic. Color to be selected by Architect.

B. Graphics to be vinyl die-cut. 3/4" Helvetica Medium caps.

C. Adhesive mounting.

D. All signs to have 1/2" Radius corners.

E. See Schedule for types.

2.04 MATERIALS -- ALUMINUM FREE-STANDING SIGN

A. Provide 1/8" thick aluminum sign, on 1-3/4" x 1-3/4" x 1/8" x 7' post; black duranodic aluminum tubing and sign.

B. Signs are to be 22" x 17" and 9” x 18” as shown on the Drawings.

C. Letters are to be vinyl die-cut. Test shall conform to access requirements of the CBC.

D. Color to be black anodized with white lettering.

E. Signs are to be sleeve mounted in concrete footings.

F. Signs shall be located per Drawing for Handicap Parking.

2.05 DEDICATION PLAQUE

A. 20” x 24” Bronze Dedication Plaque: text to be determined at a later date.

B. Plaque to have a raised perimeter band, flat-faced classic letters, leatherette (stipple) finish and rosette bolt heads.

C. Exact layout will be prepared by architect, mount in location as directed by architect.

2.06 ACCESSORIES

A. Mounting Hardware: Chrome screws; base sleeve and studs per manufacturer's recommendations.

B. Tape Mount: Double sided tape, permanent adhesive.

C. Adhesive: Silastic adhesive as recommended by manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify adequate support for Building Signs. Coordinate footings with other trades.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs after doors and surfaces are finished, in locations indicated.

1. Furnish and install all anchorage devices required to install the item and its appurtenances complete. Provide anchorage in ample time when required to be built in by other trades.

2. All wall-mounted items shall be securely fastened to solid backing or blocking.

C. Center plastic signs on doors, level.

D. Anchor all components firmly into position for long life under hard use.

E. Clean and polish.

3.03 SCHEDULES

A. Exterior building signs:

1. Handicap signs per CBC requirements and as shown on Drawings.

2. Building letters: "To be determined". Color to be determined.

3. Monument sign: 2" and 7" letters as detailed on both sides of the sign.

B. Interior signs:

1. Handicap restrooms 12" triangle for men and 12" circle for women per Title 24 - mounted on each restroom door.

2. Office and restrooms ES Plastic: 4" x length required -- 7 doors. Text to be determined by Owner. Mount beside each door with the code required Braille designations on the sign. Copy to be in two lines as possible.

END OF SECTION

SECTION 10520 - FIRE PROTECTION SPECIALTIES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide and install all Fire extinguishers and Cabinets as shown on the documents and as required by the local Fire Marshall.

B. Accessories as required for a complete and proper project.

1.02 RELATED WORK

A. Documents affecting this Work include: Sections of Division 1 of these Specifications.

B. Gypsum Systems: Roughed-in wall openings.

C. Painting: Field paint finish.

1.03 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for extinguishers.

B. Provide fire extinguishers, cabinets, and accessories by single manufacturer.

1.04 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.05 SUBMITTALS

A. Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

B. Include physical dimensions, operational features, color and finish, wall-mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.

C. Submit manufacturer's installation instructions.

D. Submit manufacturer's operation and maintenance data.

E. Include test, refill or recharge schedules, procedure, and re-certification requirements.

1.06 ENVIRONMENTAL REQUIREMENTS

Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Larsen's Manufacturing Company.

2.02 EXTINGUISHERS

Multi-Purpose Chemical Type: Larsen's Steel tank, Model MP 5, with pressure gage, and UL Rating 2A-10B:C or approved equal.

2.03 CABINETS

Typical Extinguisher Cabinet:

1. Provide Larsen's 2409-5R Vertical Duo Panel cabinet.

2. Primer finish.

2.04 ACCESSORIES

A. Mounting Hardware: Appropriate to cabinet - see manufacturer's installation instructions.

B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.05 FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Pre-drill holes for anchorage.

C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.

D. Hinge doors for 180 degree opening.

E. Glaze doors with resilient channel gasket glazing.

2.06 FINISHES

A. Extinguisher: Red enamel.

B. Cabinet Trim and Door: Primed to be painted to match adjacent surface.

C. Cabinet Interior: Enamel white.

PART 3 -- EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that rough openings for cabinet are correctly sized and located.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Install cabinets plumb and level in wall openings so that there is 54 inches from finished floor to door handle.

B. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10530 – EXTERIOR AWNING SYSTEM

Part 1: General

1.1 Description of Work

1. Work in this section includes furnishing and installation of roll-formed aluminum overhead hanger rod style canopies as manufactured by Mapes Industries Inc. or an approved equal.
2. Related Items and Considerations
    1. Flashing of various designs may be required. Generic flashing supplied by Mapes or an approved equal. Specialty flashing to be supplied by installer.
    2. Determine wall construction, make-up and thickness.
    3. Ensure adequate wall condition to carry canopy loads where required.
    4. Consider water drainage away from canopy where necessary.
    5. Any necessary removal or relocation of existing structures, obstructions or materials.

1.2 Quality Assurance

1. Products meeting these specifications established standard of quality required as manufactured by Mapes Industries, Inc. Lincoln, Nebraska 1-888-273-1132 or an approved equal.

1.3 Field Measurement

1. Confirm dimensions prior to preparation of shop drawings when possible.
2. If requested, supply manufacturer s standard literature and specifications for canopies.
3. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

1.4 Performance Requirements

1. Canopy must conform to local building codes.
2. PE Stamped calculations are required and must be signed and sealed by an engineer licensed within the state canopy is installed.

1.5 Deliver, Storage, Handling

1. Deliver and store all canopy components in protected areas.

Part 2: Products

2.1 Manufacturer

1. Mapes Canopies
   Lincoln, Nebraska
   Phone: 1-888-273-1132.
   Fax: 1-877-455-6572.
2. Or an approved equal

2.2 Materials

1. Decking shall consist of an interlocking roll-form 2 1/2 W style pan (.032" aluminum).
2. Intermediate framing members shall be extruded aluminum, alloy 6063-T6, in profile and thickness shown in current Mapes brochures or an approved equal.
3. Hanger rods and attachment hardware shall be powder coated.
4. Fascia shall be standard 8" extruded J style.

2.3 Finishes

1. Finish type shall be 2-Coat Kynar Finish.

2.4 Fabrication

1. Canopies shall be shipped in preassembled sections for ease of installation.
2. All connections shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.
3. Decking shall be designed with interlocking roll-formed aluminum members.
4. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to Rear Gutter - Leader By Others.

Part 3: Execution

3.1 Inspection

1. Confirm that surrounding area is ready for the canopy installation.
2. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries or an approved equal.
3. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed

3.2 Installation

1. Installation shall be in strict accordance with manufacturer s shop drawings. Particular attention should be given to protecting the finish during handling and erection.

3.3 After installation, entire system shall be left in a clean condition.

END OF SECTION

SECTION 10800 - TOILET AND BATH ACCESSORIES

PART 1 -- GENERAL

1.01 QUALITY ASSURANCE

A. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

B. Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.

C. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

D. Hazardous Materials: Comply with EU Directive "Restrictions of Hazardous Substances (RoHS) requirements."

1.02 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.03 SUBMITTALS

Submit in accordance with Section 01300 – Contractor Submittals of the Specifications.

1.04 KEYING

Supply two (2) keys for each accessory to Owner. Master Key all accessories.

1.05 REGULATORY REQUIREMENTS

Conform to Title 24 and City codes for installing work in conformance with ANSI A117.1.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.07 SEQUENCING AND SCHEDULING

Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.09 CLOSE-OUT: Comply with the requirements of Section 01700 – Project Closeout.

A. Reports:

None required.

B. As-Builts:

Comply with the requirements of Section 01700 – Project Closeout.

C. Operation and Maintenance Data:

None required

D. Extra Materials:

None required

E. Extended Warranty:

Comply with the requirements of the General Condition Article 6.

PART 2 -- PRODUCTS

2.01 MANUFACTURER

Basis of Design Products: Based on the quality and performance requirements of the project, specifications are based solely on the products of Bobrick Washroom Equipment, Inc.. www.bobrick.com. Location of manufacturing shall be the United States

2.02 TOILET ACCESSORY SCHEDULE

As indicated on the Drawings.

2.03 MATERIALS

A. Stainless Steel Sheet: ASTM A167, Type 304.

B. Tubing: ASTM A269, stainless steel.

C. Fasteners, Screws, and Bolts: Hot dip galvanized as recommended by manufacturer.

D. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.04 PRODUCTS

As indicated on the Drawings.

2.05 FACTORY FINISHING

Stainless Steel: No. 4 satin luster finish.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site at appropriate time for building-in.

B. Provide complete information, diagrams, templates, and instructions for the installation of all items, in sufficient time so that all backing, blocking, framing and formwork can be properly installed, and so that the work of other trades will not be delayed.

C. Verify exact location of accessories for installation.

3.03 INSTALLATION

A. Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:

1. Verify blocking has been installed properly.

2. Verify location does not interfere with door swings or use of fixtures.
3. Comply with manufacturer's recommendations for backing and proper support.
4. Use fasteners and anchors suitable for substrate and project conditions
5. Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
6. Conceal evidence of drilling, cutting, and fitting to room finish.

B. Test for proper operation

3.04 CLEANING AND PROTECTION

A. Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.

B. Touch-up, repair or replace damaged products until Substantial Completion.

END OF SECTION

SECTION 11000 - EQUIPMENT GENERAL PROVISIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish all tools, supplies, materials, equipment, and all labor necessary for the furnishing, construction, installation, testing, and operation of all equipment and appurtenant work, complete and operable, all in accordance with the requirements of the Contract Documents.

B. The provisions of this Section shall apply, in general, to all equipment specified and where referred to, and they supplement the detailed equipment specifications. The detailed equipment specifications shall govern where this section conflicts with detailed sections.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Divisions 2, 11, 15 and 17

B. Section 05500 - Miscellaneous Metals

C. Section 09900 - Protective Coating

D. Section 16000 - General Electrical Requirements

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Comply with the applicable reference specifications as specified in the General Requirements.

B. Commercial Standards: All equipment, products, and their installation shall be in accordance with the following standards, as applicable, and as specified in each Section of these specifications:

1. American Society for Testing and Materials (ASTM).

2. American Public Health Association (APHA).

3. American National Standards Institute (ANSI).

4. American Society of Mechanical Engineers (ASME).

5. American Water Works Association (AWWA).

6. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

7. American Welding Society (AWS).

8. National Fire Protection Association (NFPA).

9. Federal Specifications (FS).

10. National Electrical Manufacturers Association (NEMA).

11. Rubber Manufacturers of America (RMA).

12. Manufacturer's published recommendations and specifications.

13. General Industry Safety Orders (CAL-OSHA).

14. National Sanitation Foundation (NSF)

C. The following standards in particular are referred to in this Section of the Specifications:

ANSI B 16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
ANSI B 16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy, and Other Special Alloys
ANSI B 46.1	Surface Texture
ANSI S 12.6	Method for the Measurement of the Real-Ear Attenuation of Hearing Protections
ANSI/ASME B 1.20.1	General Purpose Pipe Threads (inch)
ANSI/ASME B 31.1	Power Piping
ANSI/AWWA D 100	Welded Steel Tanks for Water Storage
AWWA C 206	Field Welding of Steel Water Pipe
ASTM A 48	Specification for Gray Iron Castings
ASTM A 108	Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
NSF / ANSI 61	Drinking Water System Components – Health Effects

1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings: The Contractor shall furnish complete shop drawings for all equipment specified in the various Sections, together with all piping, valves, and controls for review by the Engineer.

B. Tools: Where the equipment is manufactured to require special tools for maintenance other than those normally available commercially, the Contractor shall supply one complete set of special wrenches or other special tools necessary for the assembly, adjustment, and dismantling of the equipment. All tools shall be of best quality hardened steel forgings with bright, finished heads and with work faces dressed to fit nuts. The set of tools shall be neatly mounted in a labeled toolbox of suitable design provided with a hinged cover.

C. Spare Parts: The Contractor shall obtain and submit from the manufacturer a list of suggested spare parts for each piece of equipment according to Section 01781 - Spare Parts. After approval, Contractor shall furnish such spare parts suitably packaged, identified with the equipment number, and labeled. Contractor shall also furnish the name, address, and telephone number of the nearest distributor for each piece of

equipment. All spare parts are intended for use by the Owner, only, after expiration of the guaranty period. Any spare parts which the Engineer permits the Contractor to use for startup activities shall be replaced by the Contractor prior to the Owner's acceptance of beneficial use of the equipment.

1. During the term of this Contract the Contractor shall notify the Engineer in writing about any manufacturer's modification of the approved spare parts, such as part number, interchangeability, model change or others. If the Engineer determines that the modified parts are no longer applicable to the supplied equipment, the Contractor, at its expense, shall provide applicable spare parts.

D. Torsional Analysis: The Contractor shall submit to the Engineer a torsional and lateral vibration analysis of the following equipment. The analysis shall be performed by a specialist experienced in this type of work and approved by the Engineer.

1. All engine drives.

2. All blowers and compressors with drives of 100 horsepower and over.

3. All vertical pumps with universal joints and extended shafts.

4. All other equipment where specified.

The torsional natural frequency of the drive train must be avoided by ±25 percent by any exciting frequency of the equipment, throughout the entire operating range.

E. Vibration Analysis: In the bid price the Contractor shall include at least two site visits of the above mentioned specialist for each type and size of equipment, during construction and testing of the equipment, to analyze and measure the amount of equipment vibration and make a written recommendation for keeping the vibration at a safe limit. The Contractor shall implement those recommendations to meet provisions of the Specifications.

1.05 QUALITY ASSURANCE

A. Inspection, Startup, and Field Adjustment: The Contractor shall demonstrate that all equipment meets the specified performance requirements. Contractor shall provide the services of an experienced, competent, and authorized service representative of the manufacturer of each item of major equipment and shall visit the Site to perform the following tasks.

1. Assist the Contractor in the installation of the equipment.

2. Inspect, check, adjust if necessary and approve the equipment installation.

3. Start-up and field-test the equipment for proper operation, efficiency, and capacity.

4. Perform necessary field adjustments during the test period until the equipment installation and operation are satisfactory to the Engineer.

5. Instruct the Owner's personnel in the operation and maintenance of the equipment. Instruction prior to system testing of the equipment shall include step-by-step troubleshooting procedures with all necessary equipment testing.

6. The vendor's representative shall provide a letter certifying the installation with approved test results attached.

B. Costs: The costs of all inspection, startup, testing, adjustment, and instruction work performed by factory-trained representatives shall be borne by the Contractor. The Owner will pay for costs of power and water. When available, the Owner's operating personnel will provide assistance in the field testing.

C. Public Inspection: It shall be the responsibility of the Contractor to inform the local authorities, such as building and plumbing inspectors, fire marshal, CAL-OSHA inspectors, and others, to witness all required permits and issue certificates, and pay all fees.

D. Tolerance: Tolerances and clearances shall be as illustrated on the Plans and approved shop drawings and shall be closely adhered to. Machine work shall in all cases be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without milled ends and which are to be framed to other steel parts of the structure may have a variation in the detailed length of not greater than 1/16 inch for members 30 feet or less in length, and not greater than 1/8 inch for members over 30 feet in length.

E. Machine Finish: The type of finish shall be the most suitable for the application and shall be shown in micro-inches in accordance with ANSI B 46.1. The following finishes shall be used:

1. Surface roughness not greater than 63 micro-inches shall be required for all surfaces in sliding contact.

2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.

3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.

4. Contact surfaces of shafts and stems which pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.

F. All equipment and material furnished for the project shall be brand new and free of material and manufacturing defects.

G. Manufacturer's Experience: Unless otherwise directed by the Engineer, all equipment furnished shall have a record of at least 5 years of successful, trouble free operation in similar applications, from the same manufacture.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Noise Level: When the equipment is in operation, no single piece of equipment shall exceed the CAL-OSHA noise level requirements for a one hour exposure.

B. Personal Hearing Protection: Where specified, the Contractor shall supply, in their original unopened packaging, three pairs of high attenuation hearing protectors. The ear protectors shall be capable of meeting the requirements of ANSI S 12.6 and shall produce

a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, furnished by the Contractor and mounted in an approved location near the noise producing equipment.

C. Service Factors: Service factors shall be applied in the selection or design of mechanical power transmission components. Unless otherwise specified, the following load classifications shall apply in determining service factors:

Type of Equipment	Load Classification
Blower:	
Centrifugal or vane	Uniform
Lobe	Moderate Shock
Reciprocating Air Compressor:	
Multi-Cylinder	Moderate Shock
Single-Cylinder	Heavy Shock
Pump:	
Centrifugal or Rotary	Uniform
Reciprocating	Moderate Shock
Mixer:	
Constant Density	Uniform
Variable Density	Moderate Shock
Flocculator or Clarifier	Uniform
Sludge Thickener	Moderate Shock
Grit Handling Equipment	Moderate Shock
Trash Rack Rake	Moderate Shock
Crane or Hoist	Moderate Shock

D. Welding: Unless otherwise specified or shown, all welding shall conform to the following:

1. Latest version of ANSI/AWWA D 100.

2. Latest revision of AWWA C 206.

3. All composite fabricated steel assemblies which are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipments, shall have continuous seal welds to prevent entrance of air or moisture.

4. All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

5. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be specified by the AWS code. Upon completion of the welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material which are to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.

E. Protective Coating: All equipment shall be painted or coated in accordance with Section 09800 - Protective Coatings. Non-ferrous metal and corrosion-resisting surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.

F. Protection of Equipment: All equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. All equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry at all times. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather tight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers should be avoided, to prevent accumulation of condensate in gears and bearings. For extended storage a desiccant should be included with all equipment.

G. Identification of Equipment Items: Each item of equipment shipped shall have a legible identifying mark corresponding to the equipment number shown or specified for the particular item.

H. Vibration Level: All equipment subject to vibration shall be provided with restrained spring-type vibration isolators or pads per manufacturer's written recommendation.

I. Shop Fabrication: Shop fabrication shall be preformed in accordance with the Contract Documents and the Contractor approved shop drawings.

2.02 EQUIPMENT SUPPORTS AND FOUNDATIONS

A. Equipment Supports: Unless otherwise shown, all equipment supports, anchors, and restrainers shall be adequately designed for static, dynamic, wind, and seismic loads. The design horizontal seismic force shall be greater of that noted in the general structural notes or as required by the governing building code, or 10 percent of gravity, whichever is greater.

B. Equipment Foundations: Equipment foundations shall be as illustrated on the Plans or per manufacturer's written recommendations. All mechanical equipment, tanks, control cabinets, etc., shall be mounted on minimum 6 inch high concrete bases, unless otherwise shown or specified.

C. Shop Drawings: Shop drawings shall be submitted to the Engineer for review in accordance with the requirements of the General Requirements. Shop drawings will be considered incomplete unless clear, concise calculations are presented showing equipment anchorage forces and the capacities of the anchorage elements provided by the Contractor.

2.03 PIPE HANGERS, SUPPORTS AND GUIDES

A. All pipe connections to equipment shall be supported, anchored, and guided to avoid stresses and load on equipment flanges and equipment.

2.04 FLANGES AND PIPE THREADS

A. All flanges on equipment and appurtenances provided under this Section shall conform to ANSI B 16.1, Class 125; or B 16.5, Class 150, unless otherwise shown. All pipe threads shall be in accordance with ASNI/ASME B 1.20.1.

2.05 COUPLINGS

A. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end load, and to cushion shock loads. Where required for vertical shafts, 3 piece spacer couplings or universal type couplings for extended shafts shall be installed. Selection of flexible coupling shall include service factor of driven equipment.

B. The Contractor shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.

C. Taper-lock bushings may be used to provide for easy installation and removal on shafts of various diameters.

D. Where universal type couplings are shown, they shall be of the needle bearing type construction, equipped with commercial type grease fittings.

2.06 SHAFTING

A. General: All shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut parallel with shaft centerline. Unless otherwise specified and justified by calculation, shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the diameter of the shaft. All shafts shall rotate in the end bearings and shall be turned and polished, straight and true.

B. Materials: Shafting materials shall be appropriate for the type of service and torque transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as shown or specified unless furnished as part of an assembly.

1. Low carbon cold-rolled steel shafting shall conform to ASTM A 108, Grade 1018.

2. Medium carbon cold-rolled shafting shall conform to ASTM A 108, Grade 1045.

3. Corrosion-resistant shafting shall be stainless steel or Monel, whichever is most suitable for the intended service.

C. Differential Settlement: Where differential settlement between the driver and the driven equipment may be expected, a shaft of sufficient length with 2 sets of universal type couplings shall be provided.

2.07 BEARINGS

A. General: Bearings shall conform to the standards of the Anti Friction Bearing Manufacturers Association, Inc. (AFBMA).

B. To assure satisfactory bearing application, fitting practice, mounting, lubrication, sealing, static rating, housing strength, and other important factors shall be considered in bearing selection.

C. All lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.

D. Bearing Life: Except where otherwise specified or shown, all bearings shall have a minimum L-10 life expectancy of 5 years or 20,000 hours, whichever occurs first. Where so specified, bearings shall have a minimum rated L-10 life expectancy corresponding to the type of service, as follows:

Type of Service	Design Life (years)	B-10 Design Life (hours)
1. 8-hour shift	10	40,000
2. 16-hour shift	10	60,000
3. Continuous	10	100,000

E. Bearing housing shall be of cast iron or steel and bearing mounting arrangement shall be as specified or shown, or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.

F. Sleeve-type bearings shall have a Babbitt or bronze liner.

2.08 GEARS AND GEAR DRIVES

A. Unless otherwise specified, gears shall be of the helical or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a gear teeth minimum service factor of 1.7, a minimum B-10 bearing life of 60,000 hours and a minimum efficiency of 94 percent. Worm gears shall not be used, unless specifically approved by the Engineer.

B. All gear speed reducers or increases shall be of the enclosed type, oil-or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each train. An oil level glass and an oil flow indicator shall be provided, arranged for easy reading.

C. Gears and gear drives as part of an equipment assembly shall be shipped fully assembled for field installation.

D. Gear design, manufacture and material selections shall be left to the discretion of the manufacturer, provided the above AGMA level of quality suitable for the application are met. Input and output shafts shall be adequately designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall have 2 position seals to prevent oil leakage.

E. Oil level and drain location relative to the mounting arrangement shall be easily accessible. Oil coolers or heat exchangers with all required appurtenances shall be furnished when necessary.

2.09 DRIVE CHAINS

A. Power drive chains shall be commercial type roller chains and meet ANSI Standard.

B. A chain take-up or tightener shall be provided in every chain drive arrangement to provide easy adjustment.

C. A minimum of one connecting or coupler link shall be provided with each length of roller chain.

D. Sludge collector chain and attachments shall be of the manufacturer's best standard material and suitable for the process fluid.

2.10 SPROCKETS

A. General: Matching sprockets shall be furnished with all chain drives and chain-type material handling equipment.

B. Materials: Unless otherwise specified, materials shall be as follows:

1. Sprockets with 25 teeth or less, normally used as a drive, shall be made of medium carbon steel in the 0.40 to 0.45 percent carbon range.

2. Type A and B sprockets with 26 teeth or more, normally used as driven sprockets, shall be made of minimum 0.20 percent carbon steel.

3. Large diameter sprockets with Type C hub shall be made of cast iron conforming to ASTM A 48, Class 30.

C. All sprockets shall be accurately machined to ANSI Standards. Sprockets shall have deep hardness penetration in tooth sections.

D. Finish bored sprockets shall be furnished complete with keyseat and set screws.

E. To facilitate installation and disassembly, sprockets shall be of the split type or shall be furnished with taper-lock bushings as required.

F. Idler sprockets shall be furnished with brass or Babbitt bushings, complete with oil hole and axial or circumferential grooving. Steel collars with set screws may be provided in both sides of the hub.

2.11 V-BELT DRIVES

A. V-belts and sheaves shall be of the best commercial grade and shall conform to ANSI and RMA Standards.

B. Unless otherwise specified, sheaves shall be machined from the finest quality gray cast iron.

C. All sheaves shall be statically balanced. For high-speed application, where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 rpm may be required to be constructed of special materials.

D. To facilitate installation and disassembly, sheaves shall be furnished complete with Taper lock or QD bushings as required.

E. Finish bored sheaves shall be furnished complete with keyseat and set screws.

F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.12 DRIVE GUARDS

A. All power transmission, prime movers, machines, shaft extensions, and moving machine parts shall be guarded to conform with the Division of Industrial Safety General Industrial Safety Orders latest edition and the CAL-OSHA Safety and Health Standards 29 CFR 1910, Subpart "O" and "P". The guards shall be constructed of minimum 10 gage expanded, flattened steel with smooth edges and corners, galvanized after fabrication and securely fastened. Where required for lubrication or maintenance, guards shall have hinged latched access doors.

2.13 FLEXIBLE CONNECTORS

A. General: Flexible connectors shall be installed in all piping connections to engines, blowers, compressors, and other vibrating equipment and in piping systems.

2.14 INSULATING CONNECTIONS

A. General: Where dissimilar materials are connected, insulating bushings, unions, couplings, or flanges, as appropriate, shall be used.

2.15 GASKETS AND PACKINGS

A. Gaskets:

1. Flange Gaskets: Gaskets for flanged joints shall be full-faced, 1/16 inch thick compressed sheets of aramid fiber base, with nitrile binder and non-stick coating, suitable for temperatures to 700°*F*, a pH of one to 11 (1:11), and pressures to 1000 psig. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted.

2. Water Service: Gaskets shall be ASTM D 1330, Grade I, red rubber with 1/8 inch minimum thickness and dimensions to suit contact facing.

3. Oil Service: Gaskets shall be ANSI B 16.21, non-asbestos filler with neoprene or nitrile binder, 1/16 inch minimum thickness for plain finished surfaces and 3/32 inch minimum thickness for serrated surfaces.

4. Flat Face Flanges: Gaskets shall be ANSI B 16.21, non-asbestos filler with neoprene or nitrile binder, 1/16 inch minimum thickness for plain finished surfaces and 3/32 inch minimum thickness for serrated surfaces.

5. Raised Face Flanges: Gaskets shall be continuous Stainless Steel ribbon wound into a spiral with non-asbestos filler between adjacent coils with a carbon steel gage ring. Compressed gasket thickness shall be 0.0095 inch -/+0.005 inch.

6. Grooved End Coupling Gaskets: Shall be halogenated butyl rubber suitable for the service intended and designed for use with the specified pipe material.

7. Ductile Iron Pipe Coupling Gaskets: Shall be furnished with flush seal gaskets.

8. Sleeve-Type Coupling Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage

applications shall be Buna “N”, Grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:

a) Color: Jet Black.

b) Surface: Non-blooming.

c) Durometer Hardness: 74.5.

d) Tensile Strength: 1000 PSI minimum.

e) Elongation - 175 percent minimum.

9. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.

B. Packing around valve stems and reciprocating shaft shall be compressible material, compatible with the fluid being used. Chevron-type "V" packing shall be Garlock No. 432, John Crane "Everseal," or equal. Pump seals shall be as specified in Section 11300 - Pumps, General.

C. Packing around rotating shafts (other than valve stems) shall be "O"-rings, stuffing boxes, or mechanical seals, as recommended by the manufacturer and approved by the Engineer, in accordance with Section 11300 - Pumps, General.

2.16 NAMEPLATES

A. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.17 SAFETY REQUIREMENTS

A. Where work construction areas are located within a flammable or toxic gas environment, suitable gas detection, ventilating, and oxygen deficiency equipment shall be provided. Workers shall be equipped with approved breathing apparatus.

2.18 OVERLOAD PROTECTION

A. General: Unless otherwise specified in individual equipment Sections, all sludge collectors, clarifier raking mechanism, conveyors and bar screen equipment drives shall be provided with an overload protection device as follows:

1. Mechanical System: The overload protection shall be a mechanical device to provide for reliable protection in the event of excessive overload. It shall be a ball detent type designed for long term repeatability and life. It shall be infinitely adjustable by a single adjusting nut. Once set it shall be tamperproof, and incorporate a torque monitoring and control system. It shall activate an alarm set for 85 percent, and a motor cutout switch set for 100 percent of maximum continuous running torque. A visual torque indication shall be provided and oriented so that it may be read form the walkway. The dial shall be calibrated from 0 to 100 percent of maximum continuous running torque. The design of the torque limiter should initiate the mechanical disengagement

of the drive upon overload. Each unit shall be suitable for outdoor/corrosive environments with a protective finish, corrosion inhibiting lubricants and a stainless steel cover.

2. Electronic System: As an alternative to the mechanical system, the overload protection may be an Electronic Torque Monitoring Control System capable of displaying torque, rpm's, one level of overload, and two levels of overload of the drive system. It shall incorporate a time-delay for start-up and a voltage monitoring and compensation circuit for up to 15 percent variation.

The overload device shall have an enclosure suitable for outdoor installation at temperatures of 0-70 degrees C, and relative humidity up to 95 percent. A visual torque dial shall be provided and oriented so that it can be easily read from the walkway.

The torque monitoring system shall be calibrated to: alarm and shut down the system in the event the torque drops to 50 percent of normal running; alarm at 85 percent of maximum continuous running torque and shut down the motor at maximum continuous running torque of the equipment. The system shall be calibrated at the factory of the equipment manufacturer and it shall be capable of monitoring twice the maximum continuous running torque of the equipment.

2.19 ANCHOR BOLTS

A. Equipment suppliers shall furnish calculations establishing the number, size, type, length, and embedment of anchor bolts required to mount the equipment safely in accordance with the seismic criteria illustrated in the Geotechnical Investigation Section of the Special Conditions Section of the Specifications. The installing Contractor shall supply suitable anchor bolts for each item of equipment in accordance with the equipment Suppliers' recommendations, as approved by the Engineer. Bolting templates or setting drawings shall be delivered by the equipment Supplier to permit setting the anchor bolts when the structural concrete is placed by the installing Contractor. Two leveling nuts shall be used for each bolt. The anchor design calculations must be stamped by a California registered, professional civil or structural engineer.

B. Unless otherwise shown on the Plans or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to provide adequate anchorage into structural concrete. Bolts shall extend with at least two threads over the nut after final alignment.

C. Unless otherwise specified or approved by the Engineer, anchor bolts, nuts, and washers shall be 316 stainless steel.

2.20 LIFTING LUGS

A. Lifting Lugs: Equipment weighing over 80 pounds shall be provided with lifting lugs.

2.21 NSF / ANSI STANDARD 61

All material and equipment appurtenances in contact with potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61 as being suitable for contact with potable water.

PART 3 - EXECUTION

3.01 COUPLINGS

A. The Contractor shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application; installation shall be per equipment manufacturer's printed recommendations.

3.02 INSULATING CONNECTIONS

B. All insulating connections shall be installed in accordance with the manufacturer's printed instructions.

3.03 PIPE HANGERS, SUPPORTS, AND GUIDES

A. Hangers, supports, and guides shall be spaced in accordance with ANSI/ASME B .31.1 standard.

END OF SECTION 11000

SECTION 15400 - PLUMBING

PART 1 -- GENERAL

1.01 SCOPE

Work of this section includes everything necessary and incidental to completing plumbing work, except as herein specifically excluded.

1.02 GENERAL REQUIREMENTS

A. All core drilling, cutting, and patching for the installation of work under this section shall be performed under this section of the specifications. No holes will be allowed in any structural members without the written approval of the Architect.

B. Guarantee: Furnish a written guarantee form as stipulated in section “General Conditions," for a period of one (1) year from date of acceptance of work by the owner.

1. Materials:

a. All material and equipment shall be new and in perfect condition when installed, of the best grade and of the same manufacturer throughout for each class or group of equipment. Materials not identified by name or manufacturer shall be comparable to that specified arid as approved by the Architect. Maintain adequate job protection for all materials, equipment and work of other trades. Store all pipe at least four inches (4") above grade to avoid contact with water and dirt.

b. Unless otherwise directed by the Mechanical Engineer In writing, or specified or indicated, all materials, fixtures and equipment shall be installed in accordance with manufacturer^{t}s recommendations and instructions.

c. Plumbing equipment shall bear the manufacturer's label nameplate showing all performance characteristics. All valves, pipe fittings, etc., shall bear the manufacturer's trademark or identifying markings.

d. All materials of similar function or service shall be of one manufacturer.

2. Approval of Materials:

a. Within thirty (30) days after award of the contract, submit to the Architect, ten (10) copies of a complete list of material and equipment Proposed for the job including rating and capacity data, sizes, grade, electrical data, part or catalog number, manufacturer's name, pictures, catalog cuts, etc.

b. Submit with the above list, ten (10) copies of complete shop drawings for all fabricated equipment and ten (10) copies of complete wiring diagrams with descriptions and details.

c. For additional submittal requirements refer to Part 3 Execution: 3.05, C. Execution paragraph 3. No exceptions will be allowed for this requirement.

d. d. Safety Compliance: All materials, equipment and installation shall comply with the requirements of "Occupational Safety and Health Act" (OSHA) Standards.

C. Verification of Dimensions:

1. All indicated dimensions are approximate and are given for estimating purposes only. Before proceeding with the work, this contractor shall carefully check and verify all dimensions, sizes, required clearances and shall assume full responsibility for the fitting

of all equipment and materials herein required to other parts of the work and to the work of other trades.

2. The drawings are essentially diagrammatic to the extent that all offsets, bends, special fittings and locations are not exactly located.

3. This contractor shall comply with all contract documents in laying out his work and equipment. He shall coordinate the work of this section with the work of other trades and all job conditions.

4. The installation of valves, thermometers, gauges, cleanouts, water hammer arrestor access doors or other indicating equipment or specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

5. Where wall and ceiling access doors are required for access to plumbing equipment, doors shall be furnished and installed under other sections. Coordinate this requirement with appropriate section of specifications.

D. Rough-In: Rough-in and final connections shall be provided for equipment furnished under other sections and by the owner in accordance with rough-in drawings furnished by others. Future equipment, as noted on the drawings, shall be provided with all required rough-in utilities.

E. Before submitting his bid for the work under this division the contractor shall carefully study all drawings and shall make a careful examination of the premises. He shall determine in advance, the methods of installing and connecting the equipment, the means to be provided for getting the equipment into place and shall make himself thoroughly familiar with all the requirements of the contract. After award of the contract, no subsequent allowances will be made to the contractor due to the failure to comply with the above requirements or any other conditions affecting the installation and completion of the work.

F. Any minor changes in work, which have not been installed, shall be made by this contractor without additional compensation except changes that increase or decrease the size of the materials specified or indicated on the drawings. This contractor shall submit an estimate of the cost, or credit for, such changes he does not consider of a minor nature and shall proceed only upon the written authorization of the Engineer.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS AND TESTS

Requirements and Submittals

1. Conformation to requirements of Uniform Plumbing Code 1994 Edition, local and/or State codes and/or Ordinances, including the Uniform City and County Building Codes, State County and Local Health Department Ordinances, State of California Industrial Accident Commission Safety Orders.

2. Apply and pay for all permits, fees, inspections, examinations and tests required by any legally constituted authorities.

3. Submission of six (6) brochures containing certified manufacturer's drawings and cuts of all equipment and specialties within thirty (30) days after Contract is signed. Partial or incomplete submittals will be rejected and will be returned to Contractor for re-submittal.

   a. Submittals shall be in a neat ring binder form and shall contain a complete list, in index form, of the manufacturer's names, cuts of equipment, performance data, catalog numbers and trade names; as required; to properly identify the materials and equipment to be furnished under these specifications.

b. Data submitted for each item shall be properly identified by reference to item number of paragraphs in the specifications and mechanical drawings' equipment schedule designation.

c. Any deviation from item as specified shall be clearly indicated on the submittal and noted as such.

d. These specifications and accompanying drawings specify and illustrate equipment and materials deemed most suitable for the service anticipated. This is not to preclude other products equally as good and efficient. The contractor shall prepare his bid on the basis of the particular equipment and materials specified for the purpose of determining the low bid.

e. The awarding of the contract shall constitute a contractual obligation to furnish the specified equipment and materials.

f. After the execution of the contract, should the contractor desire to substitute equipment other than that specified in the contract documents, such substitution will be considered for one reason only:

g. The equipment proposed for substitution is superior in construction and efficiency to that specified herein.

h. In the event the contractor obtains the Engineer's approval of equipment other than that herein described; he shall, at his own expense, make any changes in the structures, buildings, or piping necessary to accommodate the equipment and shall furnish record drawings to the Engineer.

i. It will be assumed that the cost to the contractor of the equipment proposed to be substituted is less than that of the equipment specified in the contract documents; and, if the substitution is approved, the contract price shall be reduced by an amount equal to the savings.

PART 2 -- PRODUCTS

2.01 PIPING INSTALLATION

A Arranged as shown on the drawings and as required for a complete system.

B Run straight and true to line and as direct as possible.

C Risers shall be plumb. Form right angles on parallel lines with building wall.

D Keep pipes close to walls and partitions, offset only where necessary to follow walls, or as directed.

E Locate groups of pipes parallel to each other. Pipe spacing shall permit application of full insulation and access for servicing valves.

F All piping shall be isolated from other piping, any part of the building, framing, conduit, etc., with one-inch (1") strips of hair, felt, or pipe isolators.

G Risers shall not have couplings in runs from one floor outlet to next.

H All piping shall be concealed in walls or above ceilings unless otherwise noted.

I Street elbows, bushings, and long screw fittings will not be allowed for on-site buildings.

J Cleanouts:

1. Floor cleanouts, as specified (see plans for size), shall be no-hub and installed into pipe where shown on plans. Floor cleanouts shall be accessible in all cases and shall be brought to surface on "WYE" branches.

2. Wall cleanouts, as specified (see plans for size), shall be taper thread plugs and installed into pipe where shown on plans. Wall cleanouts shall be accessible in all cases.

3. All cleanouts shall be provided with removable floor or wall plate as hereinbefore specified.

4. Cleanouts to grade shall be provided with either a traffic rated brass cap or concrete yard box.

K. Install stops on all hot and cold-water fixture supplies, unless integral stops are specified. Supply trim shall have all metal-to-metal connections.

L. Protect open pipe ends. Keep piping free from scale and dirt; protect open ends whenever work is suspended during construction to prevent foreign bodies entering and lodging there; use temporary plugs$_1$ or other approved material for protection.

M. Bending or mitering of pipe to constitute fittings shall not be permitted.

2.02 DOMESTIC HOT AND COLD WATER PIPING SYSTEM

A. Mains, risers, branches, connections of sizes and arrangement as indicated on drawings.

B. Shut-off valves shall be provided in main branches, runs to risers and where indicated on drawings.

C. Piping below grade shall be dipped and wrapped with "Hunt's Process" No. HP#6-F. All field joints and fittings shall be double wrapped with "Scotch Wrap" No. 50. In lieu of wrapping, "X-Tru-Coat" steel pipe shall be considered an approved equal.

D. Joints under concrete slabs, if allowed by local codes, shall be brazed.

2.03 SOIL, WASTE, AND VENT PIPING SYSTEMS (CAST IRON PIPING)

A. Mains, risers, branches and connections of sizes and arrangement as indicated on drawings.

B. Cast iron soil pipe and fittings below grade shall be service weight single-hub type.

1. Shall be no-hub service weight using the "Anaheim Foundry Company," HUSKY Series 4000, heavy duty, all stainless steel (#304) coupling:

a. One and one half (1 1/2"), two inch (2"), three inch (3"), four inch (4"), diameter coupling shall consist of a three inch (3") wide corrugated 304 stainless steel shield in conjunction with four (4) stainless steel clamps mounted in series, secured in place by means of a fixed and "floating" eyelet to allow clamp travel during tightening.

b. For five inch (5"), six inch (6"), eight inch (6"'), and ten inch (10"), shall consist of a four-inch (4") wide corrugated 304 stainless steel shield in conjunction with six (6) stainless steel clamps mounted in series, secured in place by means of a fixed and "floating" eyelet to allow clamp travel during tightening.

c. All HUSKY Series 4000 couplings, or approved equal, shall be installed using a factory preset torque wrench, set to 80 inch-pounds.

C. Above grade piping and vent line shall be service weight cast iron with no-hub joints.

D. Vent piping may be schedule 40 galvanized steel in lieu of item 2.02, C.

E. Cleanouts shall be provided as previously specified and in the following locations:

1. Near bottom of each stack and riser.

2. At every 135-degree change of direction for horizontal line.

3. Every one hundred feet (100') horizontal run.

F. Extend cleanouts to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall-type cleanouts.

G. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gasses pass freely to atmosphere with no pressure for siphon condition on water seal.

H. Vent entire system to atmosphere. Discharge fourteen inches (14") above roof. Join lines together in fewest practical numbers before projecting above roof (see plans for locations). Offset vent lines so they will not pierce roof near an edge or valley.

I. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange or coupling.

J. Grade all soil and waste lines at one quarter inch (1/4") fall per foot, indirection of flow; unless otherwise noted on plans (see plans for other locations)

2.04 VALVES

A. Provide shut-off valves where indicated and specified; and in the following locations:

1. Risers and main branches at points of take-off from their supply or return mains.

2. Individual equipment units at Inlet and outlet to permit unit removal for repairs without interfering with remainder of system.

B. Locate valves for easy access and operation; where concealed, access doors shall be provided under other sections. Coordinate requirements with General Contractor.

C. Do not locate valves with stems below horizontal.

2.05 CONCEAL PIPING

A. Where indicated or specified, conceal piping in building construction. Install such piping in time so as not to delay work of other trades and to allow ample time for tests and approval; do not cover before test approval is obtained from the Engineer.

B. Run up branches passing through floor or roof into partition; offset above floor close to equipment unit; expose only as much as necessary for final connection.

C. Where furred spaces are indicated, keep pipes as close to structural members as possible so as to require minimum furring. In case of furred beams, obtain approval, from Architect, of resulting headroom clearance before installing pipes.

D. Access panels: Install where shown and over all concealed valves, cleanouts, isolation unions and any concealed equipment which may require access for operation, maintenance and repair. Panel shall be sized for proper service and be not less than twelve Inches by twelve inches (12" x 12"), furnished and installed by this contractor.

2.06 PIPES PIERCING WATERPROOFING

For pipes passing through waterproofed floor or roof, provide sleeves and flashing to maintaining watertight condition. Submit details for approval.

2.07 CHECK FOR INTERFERENCES WITH OTHER TRADES

A. Before installing piping, check architectural, structural, plumbing, electrical and fire protection drawings. Make accurate layout of all piping, including installed elevations. Submit copies of final layout to other trades for coordination with their work so that grouped pipes, conduit, and ducts will not interfere with each other, or with full swing doors and will leave minimum headroom as indicated.

B. Coordination of the mechanical piping is the responsibility of this section.

C. Protect open pipe ends. Keep piping free from scale and dirt. Protect open ends whenever work is suspended during construction to prevent foreign bodies entering and lodging there; use temporary plugs, burlap, or other approved material for protection.

2.08 SUPPORTS, HANGERS, FLASHING, AND SEISMIC RESTRAINT

A. Pipe Support:

1. All piping shall be supported in such a manner that it is securely attached to the structure of the building. Attachment is to be capable of supporting the tributary weight of pipe and contents in any direction. Maximum spacing of support and braces shall be as detailed on drawings.

2. Support horizontal overhead piping with clevis hangers. Upper end of hanger rod shall be supported from a code-approved attachment. See drawings for pipe support details. Submit shop drawings of all piping supports for approval.

3. Piping shall be attached to top chord members only of prefabricated roof or floor trusses. Where plywood web trusses occur, pipe support may be secured to additional web stiffeners as shown on plans.

B. Flashing: Pipes through roof shall be flashed with "Semco" No. 1110-7 steel reinforced boot type, six (6) pound seamless lead flashing with suitable counter flashing sleeve, or as approved by the Architect. Submit shop drawings for approval.

C. Seismic Restraint: All piping and equipment shall be suitably restrained and anchored in both horizontal and vertical directions to withstand seismic forces as required by the State of California. See drawings for details.

2.09 PIPES OVER ELECTRICAL EQUIPMENT

A. Where pipe joints or valves in cold and hot water lines occur within two feet (2'0") in horizontal direction from electrical panels, or equipment, provide a drip pan of size that will afford protection. Submit pan size and construction for approval.

B. Pans shall be 18 GA. GI sheet, edges turned up two and one half inches (2 1/2") all sides, reinforced with galvanized angles or by rolling edge over one quarter of an inch (1/4") diameter galvanized wire.

C. Provide drain with three quarters of an inch (3/4") galvanized flange and galvanized pipe drain to nearest floor sink.

D. Support with galvanized bars or angles, brace to prevent sagging or swaying, as detailed for ductwork.

2.010 PIPE AND FITTING MATERIALS

A. Service Defined: Classification and names of services as used in "Schedule of Pipe and Fitting Materials" herein, shall have the following meaning:

1. Cold Water: Connections from cold water supply outlets provided by Plumbing Contractor to equipment and for makeup.

2. Drains: Drains from expansion or storage tanks to floor drains, drains from air conditioning equipment condensate pans or piping drip pans.

B. Schedule: Unless otherwise specified, pipe and fitting materials shall conform to following schedule:

1. Interpretation of Schedule: Figure "40" and "80" following pipe material in this schedule designate pipe wall thickness, conforming to ASA B36.l0, applicable to sizes one inch (1") to ten inches (10") inclusive. Figure "40" shall mean "standard, "80" shall mean "extra strong" or "extra heavy," in the accepted trade terminology for pipe wall thickness.

a. Fittings shall conform to pipe as to black, galvanized, or C-P finish.

b. Schedule of Pipe and Fitting Materials

Service	Pipe Material Weight	Type of Joints	Pressure Fittings Material	Shut-Off Rating PSI SwP	Valve
Cold Water ABV. Gnd.	Copper L Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball, Check Butterfly
Cold Water Below Gnd.	Copper K Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball Butterfly
Hot Water Abv. Gnd.	Copper L Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball Butterfly
Vent	Service Weight Cast Iron	No-hub Screwed	N/A	N/A	N/A
Waste & Soil	Service Weight Cast Iron	No-hub	N/A	N/A	N/A
Drains	Copper L Tube	Soldered	Bronze	125	
Medical Gas Oxygen	Copper K Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball
Condensate	Copper L Tube	Soldered	Bronze	125	Butterfly

2.011 ASTM DESIGNATIONS FOR PIPE AND FITTING MATERIALS

A Pipe, as specified in schedule, shall conform to requirements covered by following ASTM designations:

1. Steel 40 or 80: A-53, Grade B.
2. Copper Tube "B": B-75.
3. Copper Tube "K" and "L~: B-88.
4. Cast Iron Waste: A74-80.

B Fittings, as specified in schedule for various services, shall conform to requirements covered by the following ASTM designations:

1. Malleable Iron: A-197.
2. Steel Welding Type: A-234.
3. Bronze, Solder Joint: B-88.
4. Wrought Copper, Solder Joint: ANSI B16.22, B16.18.

5. ABS: D2661-85a & D3311-82

2.012 MANUFACTURERS OF PIPE AND FITTINGS

All pipe and fittings shall be "U.S." manufactured. Pipe manufacturer shall be submitted for approval. The following manufacturers shall be acceptable for materials listed under each group:

1. Steel Pipe
   a. U.S. Steel Co.
   b. Republic Steel
   c. California Steel Industries
   d. Pioneer Pipe of Utah
   e. Kaiser Steel
   f. Bethlehem Steel Co.
   g. National Tube Co.
2. Copper Tubing and Fittings
   a. Muller Brass
   b. Chase
   c. Revere
   d. Cerro
3. Cast Iron Pipe
   a. Alhambra
   b. Anaheim Foundry
   c. U.S. Pipe and Foundry
   d. Universal Cast Iron Manufacturing

2.013 PIPE JOINTS

A. Unless otherwise specified, join pipe as follows:

1. All steel pipe two inches (2") and smaller shall have screwed joints.
2. All steel pipe two and one half inches (2 1/2") and larger shall have welded joints.
3. All copper pipe shall have soldered joints made with 95-5 tin/antimony solder.
4. Galvanized vent pipe shall be screwed "Durham" tarred drainage fittings.
5. All joints in underground and under-floor distribution piping shall be welded, regardless of size.

B. Welding Exceptions: In locations such as risers in shafts or mains in crowded corridors, where welding may be difficult; permission may be given by job inspector or Mechanical Engineer to use screwed joints up to four inch (4") size.

C. Welding Process, Procedure:

1. Where welding is required by work of this section, such work shall only be performed by welders qualified and certified by a recognized, approved agency. Such certification shall bear a date not more than six (6) months prior to date of starting work under this section and shall be submitted and approved by the job inspector and Mechanical Engineer prior to starting work.

2. Pipe welding shall comply with the latest revision of applicable code, ASA Code for Pressure Piping and State requirements. Before welding is performed, contractor shall submit to the Mechanical Engineer evidence of compliance of welding and operator's qualification according to provisions of governing codes. Standard Procedure Specifications and operators qualified by National Certified Pipe Welding Bureau shall be considered as conforming to requirements of these specifications.

3. Use only welding type fittings and welding neck flanges. The following exceptions may be used, only as approved by the Mechanical Engineer:

   a. Join "small" branches into mains with intersection weld, instead of using welding type tee. "Small" shall mean that the branch is one size less than half the size of the main which it intersects as: 1 1/4" branch into 3" main; 1 1/2" branch Into 4" main; 2" branch into 6" main; 4" branch into 10" main.

   b. Use only "Weldolet" of "Threadolet" type of welding fittings for intersection welding of branches to mains.

4. Do not make direct welded connections to valves, expansion joints, strainers, apparatus, and other equipment, which are intended to be removable.

5. Brass piping shall have screwed joints for sizes two inches (2"), flanged for two and one half inches (2 1/2") and larger.

D. Brazing Option: Brazing of threadless brass pipe to bronze fittings with preinserted rings, will be acceptable in place of screwed joints.

1. For brazing joints on threadless brass pipe and copper "B" tube, copper tube type "K" and "L," use brazing alloy, 80% copper, 15% silver, 5% phosphorous, which will flow freely at 1300 °F; Handy and Harmon "Sil-Fos," or approved equal; use flux and brazing method recommended by manufacturer of brazing alloy.

2. Copper tube type "K" and "L" shall have soldered or sweated joints with solder-joint type or copper fittings. Flared joints with flare type bronze fittings may be used where approved for specific service. Solder shall be 95-5 or equal.

3. Do not make brazed or soldered connections to valves, expansion joints, strainers, apparatus, other units, which are intended to be removable.

E. Screwed Joints:

1. For screwed joints use red or white lead and oil, or approved pipe-joint compound; apply only on male threads.

2. Brass pipe shall have screwed joints, for sizes two inches (2") and under; flanged two and one half (2 1/2") and over.

3. Cut pipe, nipples evenly, cut threads clean, remove burrs, ream ends to full inside bore. Cut brass pipe with hacksaw rather than with pipe cutter.

4. Do not use Stulson Wrench for making brass pipe joints tight; such pipe, bearing wrench marks, will not be acceptable and shall be replaced at Contractor's own expense.

F. Joints of Dissimilar Metals: Provide with "EPCO" dielectric valves isolation couplings of same size as pipe.

G. Pipe Preparation:

1. Pipe shall be carefully cleaned before installation. The ends of threaded pipe shall be reamed out full-size with a long taper reamer so as to be partially bell-mouthed and perfectly smooth.

2. All threads on black steel pipe shall be cut with new clean dies, full thickness of the die and so that no more than two (2) threads are left exposed on the pipe when the joint is made up in the fitting or valve.

3. Copper, brass pipe and chromed, polished or painted. Connections from fixtures shall show no tool marks. Install with approved wrenches.

4. Thread lubricant shall be used for all threaded joint make-up and shall be applied to the make thread only. Lubrication shall include threaded cleanout plugs.

2.014 PIPE SLEEVES, ESCUTCHEONS, COVERS

A. Furnish and set sleeves to accommodate pipes passing through foundations, walls, floors, partitions, and roof; provide escutcheons at exposed finished surfaces pierced by pipes.

B. Any pipe passing through a wall of a vertical shaft or through a wall of an occupancy separating or floor shall pass through a 16 GA G.I. sleeve. After pipe has been installed through sleeve, remaining space shall be packed tightly with an inert packing and secured on each side of wall with a 16 GA escutcheon around pipe. Submit shop drawings for approval.

2.015 VALVE TYPES

A. General: For valve location and installation, refer to "Valves" under "Piping Installation herein and the drawings.

B. Valve Requirements: Unless otherwise indicated or specified for particular system or individual equipment, following requirements shall apply:

1. Valves, General: Designed for packing under pressure with valve open or closed.

2. Valves used for throttling of controlling flow: Globe type as indicated. For shut off use butterfly or ball type as indicated.

3. Ball valves on all cold water and hot water piping unless otherwise noted.

4. Valves shall have rating of not less than 125-PSI SWP or as indicated in service schedule.

5. Valve Material: Bronze for sizes two inches (2") and smaller.

6. Valve ends: Screwed for all sizes two inches (2.') and smaller, except copper tube.

7. Valve ends for copper tubes, Type K and L: Solder joint type.

8. Flange valves shal1 have flange drilling to suit joining pipe flanges.

9. Gate valves shall have solid tapered wedge, except whore otherwise specified.

10. Globe type valves shall have renewable composition discs recommended by manufacturer for intended service, or renewable bevel seat and metal disc where so specified.

11. Check valves shall be horizontal swing type with bronze seat and composition or bronze disc as approved; body of same material, pressure rating, screwed or flanged, finish as adjoining globe or gate valve. Check valves in pump discharge lines shall be of the spring-loaded non-slam type as manufactured by "Mission" Duo Check Series 150-S-M-F.

C. Submit complete shop drawings and catalog cuts of all valve types to be used, for review and approval by Mechanical Engineer, prior to installation. No Exceptions.

2.016 VALVE CATALOG NUMBER DESIGNATIONS

A. Valve design, material of components, workmanship, and other features: Equal to "Stockham Valve Company" catalog numbers (unless otherwise noted) for various types of valves listed.

B. Gate Valves:

1. Screwed, bronze, union bonnet, rising stem, 150-PSI SWP; NO. B-120.
2. Screwed, ibbm, non-rising stem, 125-PSI SWP; NO. G 608.
3. Flanged, ibbm, non-rising stem, 125-PSI SWP; NO. G 461.
4. Flanged, ibbm, OS & Y, 125-PSI SWP; NO. G-623.

C. Ball Valves:

1. Screwed two inches (2") and smaller, cast bronze body, 40 PSI WOG, "Apollo 3" Series 82.
2. Valves shall include reinforced Teflon packing ring, thrust seal, body seals and seats.
3. Balls shall be chromium-plated bronze, with full size ports.
4. Quarter turn on-off, adjustable packing gland and internally inserted stem.
5. 2 1/2" and larger: "Powell" 150 PSI, flanged ball valve Fig. 4226T with 316 stainless steel (SS) body and 316 55 ball and stem with Teflon seat.

D. Globe and Angle Valves:

1. Screwed, bronze, composition, 150-PSI SWP; B-22 globe, No. 17 angle.
2. Screwed, bronze, bevel seat and metal disc$_1$ 200P51 SWP, B-37 globe, No. 701 angle.

E. Check Valve, Horizontal Swing Type (not for pump discharge):

1. Screwed, bronze body, bronze disc, 125-PSI SWP; B-319.
2. Flanged, cast iron, bronze disc, 125-PSI SWP; G-931.

F. Cocks

1. One inch (1") and larger, 175 lb. brass, square head, "Powell" Fig. 2201 lubricated type.

2.017 MANUFACTURER OF VALVES

A. Valves: "Stockham," "Crane," "Nibco" or "Potter-Roemer."

B. All valves shall be the product of manufacturer.

C. All valves shall bear name or trademark of manufacturer, working pressure, and direction of flow cast or stamped on valve body.

2.018 PIPE ISOLATION

A. Hangers shall be separated from pipe by means of steel encased hair felt padded isolation.

B. Isolator shall be as manufactured by “Lemco-Trisolators" or “Potter Roemer RP Isolators." Submit shop drawings for approval.

2.019 PIPING IDENTIFICATION

A. Each individual pipeline concealed or exposed shall be labeled for quick and easy identification as to direction of flow and content of materials carried in the pipes by method of stenciling.

B. Labels shall be installed at each valve, special fittings and at all branch take-offs and twenty feet (20’-0") apart on long runs.

C. Samples of all stenciling for flow and content shall be submitted for approval prior to installation.

LETTERS

1. Domestic Hot Water Supply: DHW
2. Domestic Cold Water Supply: DCW
3. Soil: S

4. Waste: W

5. Gravity Condensate: GC

D. Prior to stenciling, all fuel gas piping shall be provided with one coat of primer paint and one coat of yellow paint. Primer arid paint types as selected by the Architect.

2.020 PLUMBING FIXTURES

A. All plumbing fixtures indicated on drawings and/or specifications shall be furnished and installed in accordance with manufacturer's specifications by this contractor.

B. Plumbing fixtures shall be as follows, with connection sizes as indicated in fixture schedule on the plumbing drawings:

1. Water closet WC-1: American Standard "Cadet" 18" high 9468.018 (1.6) gallons per flush, floor mounted, siphon jet, white vitreous china, elongated bowl. 1 1/2" top spud with Sloan Royal 113 flush valve, 1.6 gallons per flush, Church plastic seat model 295C, elongated, open front, with external check hinge, scratch and stain resistant. C.E.C. listed.

2. Water closet WC-2: American Standard "Madera" 2221.018 (1.6) gallons per flush, floor mounted, siphon jet, white vitreous china, elongated bowl. 1 1/2" top spud with Sloan Royal 113 flush valve, 1.6 gallons per flush, Church plastic seat model 295C, elongated, open front, with external check hinge, scratch and stain resistant. C.E.C. listed.

3. Urinal U-1: American Standard "Allbrook" 6541.132 wall hung, white vitreous china. 1 1/4" top spud Sloan royal flush valve 186-1. 1 gallon per flush, J.R. Smith urinal support model 644. C.E.C. listed.

4. Lavatory L-1: American Standard "Lucerne" 0355.027, white vitreous china, wall-hung lavatory with faucet holes on 4" centers. Front overflow, 1 l/2"x 1 1/4" cast brass P-trap with chrome finish. Symmons "Scot" S-60-G-H metering faucet with 4" center set. Rose spray outlet with 0.5 GPM flow rate. Grid strainer. Chicago 1028 angle stops w/ rigid riser. C.E.C. listed.

5. Sink S-1: Elkay Rigidbilt Stainless Steel Scullery Sink, RNSF8358LR 16 GA type 304 stainless steel, Square welded construction 18"x 24"X13 ½" with faucet holes on 8" centers punched for 3 holes. 1 1/2" cast brass L.A. pattern P-trap with chrome finish. Elkay LK-35 chrome basket strainers. Elkay LK499 chrome plate mixing faucet with 10" high gooseneck spout with aerator, BH4 wrist blade handles. Chicago 1003 angle stops w/ rigid riser.

6. Sink S-2: Elkay Stainless Steel Hand Sink, ELV2219 18 GA type 304 stainless steel, backsplash with faucet holes on 4" centers punched for 3 holes. 1 1/2" cast brass L.A. pattern P-trap with chrome finish. Elkay LK-8 chrome grid strainers. Elkay LK411 chrome plate mixing faucet with 11" high gooseneck spout with aerator, BH4 wrist blade handles. Chicago 1003 angle stops w/ rigid riser

7. Drinking Fountain DF-1: Haws model 1010 wall mounted dual bubbler drinking fountain, front push bar operated, 18 GA. type 304 stainless steel with #4 satin finish. Polished chrome plated vandal-resistant bubblers and push bars, self-closing valves, automatic stream regulation. 1/2" IPS screwdriver stops, chrome plated waste strainers, 1 1/4" ips traps and vandal resistant bottom plates.

8. Floor Drain FD-1: J.R. Smith #2005-A-P-PB, 5" square top, 2" outlet, trap primer connection, duco cast iron body with polished bronze grate.

9. Floor Sink FS-l: J.R. Smith #3410-12, 8" square top -medium receptor, no hub, 2" pipe size connection, cast iron flanged receptor, acid resistant coated interior and acid resistant coated grate.

10. Trap Primer TP-l: Precision Plumbing Products, Inc. model "Prime-rite" 1/2" inlet and 1/2" outlet with distribution unit may be located as indicated on drawings or as required by code. UPC listed.

11. Water Hammer Arrestor WHA-l: Precision Plumbing Products, Inc. model "SC-Series" (size as required), installed on all quick closing valves and all valves which close with the flow of fluid, or on headers serving more than one fixture. Provide a 12"x 12" access panel.

12. RD-1: J.R. Smith #1083-C Roof Drain. Duco cast iron body with no-hub fitting, combined flashing clamp, gravel stop and adjustable “Flow Rate Control” assembly and dome.

13. OD-1: J.R. Smith #1080-C Overflow Drain. Duco cast iron body with no-hub fitting, combined flashing clamp, gravel stop and adjustable “Flow Rate Control” assembly and dome. 3 1/2” water dam.

C. Interior exposed pipe, valves, and fixture trim shall be chrome plated.

D. The complete installation of each fixture shall include trap and accessories with accessible stop or control valve in each hot and cold-water branch supply line. Fixture floor connections shall be made with approved brand of cast Iron floor flange, soldered or caulked securely to waste pipe. Make joint between fixture and floor flange tight with approved fixture setting compound or gaskets.

E. Polish chrome finish at completion of project.

F. Install fixtures and fittings as per local codes and manufacturer's instructions.

G. Do not use flexible water piping.

H. Caulking: Fixtures shall be bedded and caulked along joint at walls, counter tops and other intersecting surfaces with "Polysenseal" distributed by "Gladding-McBean" or approved equal.

I. Backing for all fixtures indicated on wall shall be one quarter inch by six inches (1/4" x 6") steel) plate; recessed flush with stud face and extending to next stud beyond fixture on each side. Secure plate top and bottom at each stud and weld three-eighths inch (3/8") steel stud bolts to each stud. See fixture schedule for type of support required. For wood stud installation, secure backing plate to each stud with three-eighths inch by two-inch (3/8" x 2") long lag bolts. Minimum two (2) per stud.

2.021 WATER HAMMER ARRESTORS

A. Piston operated, type K copper barrel, with brass threaded adaptor:

1. The piston shall provide a permanent mechanical barrier between fluid and pre-load air change.

2. The piston shall be equipped with two (2) O-rings, "Parker Specifications" N741-75, temperature rated 40 ^{0}F to 450 ^{0}F. Seal lubricant shall be "Dow Corning" Silicone Compound #111 *FDA* listed as safe for use in potable water systems.

B. Shall be designed to operate under domestic and commercial line pressures. Shall be equal to the pipe diameter at the point of installation.

C. The installation shall be made in the vertical or horizontal positions from the source of lock. Shall be installed in the following locations:

1. All quick closing valves.

2. All valves that close with the flow of fluid.

D. Normal arrestor operating pressure shall be 35 to 250 Psig, with a maximum surge or spike pressure not to exceed 1500 Psig.

E. Arrestor shall be fully guaranteed in writing by manufacturer for the entire life of the system.

F. Shall be as manufactured by "Precision Plumbing Products, Inc.," SC Series. Submit shop drawings for approval by the Mechanical Engineer.

2.022 CLEANOUTS

A. Floor: "J.R.Smith" #4023 or #4043 or "Zurn" #1400-2 or #1440-3, with polished nickel bronze non-skid adjustable round or square top. Use carpet clamping type top with carpet marker in carpeted areas.

B. Dry Wall: "J.R.Smith" #4670 or approved equal by "Zurn" or "Josam;" prime coated steel, face or wall type.

C. All other walls: "J.R.Smith" tl4470 or approved equal by "Zurn" 1470 series with chrome plated cover and screws. Provide "J.R. Smith" #4715 or approved equal where wall thickness is inadequate to conceal cleanout.

D. Submit shop drawings and/or catalog cuts for each type for Mechanical Engineer's approval, prior to installation.

2.023 PIPE INSULATION

General

1. Furnish and install thermal insulation on clean dry surfaces; after testing, inspection, and approval in strict accordance with these specifications, contract documents and manufacturer' 5 recommendations.

2. All insulation and accessory material shall meet the requirements of flame spread not to exceed 25 and smoke developed not to exceed 50, as tested by "Procedure ANSI/ASTM-E-84, NFPA 225 or UL 723.

3. Insulation shall be as manufacture by "Manville" or as approved by the Mechanical Engineer, prior to installation.

4. Installation: By skilled appliers directly in the employ of firms with a minimum of five (5) years successful installation experience, specializing in this type of work.

5. Pipe Hangers shall be installed outside the insulation. This contractor shall insert a section of cellular glass insulation at the support of a length not less than twice pipe diameter.

2.024 EQUIPMENT IDENTIFICATION

Valves

2.01 Numbered brass disc attached to each valve for identification.

2.02 Valve tag shall be stamped to identify type of service and sequence number (i.e.: HW-l). Submit sample valve tag for approval prior to installation.

2.03 Valve directory to be provided with operations and maintenance submittals.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 OPERATING AND MAINTENANCE DATA

Data: Submit to the Architect for approval, prior to acceptance of the installation, complete and at one time. Partial or separate data will not be accepted. Data shall consist of the following-

1. Manufacturer's Literature: Six (6) copies of manufacturer's instructions for operation and maintenance of all equipment, valves, and controls; including replacement parts lists.

2. Written Instruction: Typewritten instruction for operation and maintenance of the system composed of Operation Instructions and Maintenance Instruction. Six (6) copies submitted to the Architect for approval.

3. Operating instructions shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions.

4. Maintenance instructions shall list each item **(**i.e. plumbing fixtures and equipment) requiring inspection, lubrication, or service and describe the performance of such maintenance.

5. Verbal Instructions: Operating personnel shall be instructed in the operation of the systems in accordance with typewritten instructions. No other verbal instructions shall be given.

6. Binders: Four (4) complete sets of the above data in loose-leaf, ring type binders with permanent covers, with identification on inside cover.

3.03 SPECIAL REQUIREMENTS

A. The manufacturer and/or supplier of all equipment shall certify in writing to the owner that this equipment complies with these specifications.

B. All new equipment shall be anchored as required and/or as detailed on drawings.

C. Written Certifications, in a form approved by the Mechanical Engineer, shall be provided by the equipment manufacturer or his authorized representative:

1. That the equipment and its installation was inspected on the job by the manufacturer and that the equipment is in first-class condition throughout, was installed in accordance with manufacturer's requirements and recommendations, and that the installation is approved by the manufacturer.

2. That the equipment is operating in a safe and satisfactory manner and is delivering capacities and performance hereinbefore specified and/or indicated on the drawings.

3. The following shall be certified as described above: All plumbing fixtures and domestic hot water heaters.

D. Damage by Leaks: The contractor shall be responsible for all damage to equipment and premises caused by leaks or breaks in piping or equipment for a period of one (1) year after date of final acceptance.

E. Unless otherwise directed, and/or specified, and/or indicated, all materials and equipment shall be installed in accordance with the manufacturer's recommendations and instructions.

F. Plumbing equipment shall bear the manufacturer's label or nameplate showing performance characteristics. Identifying size or model number shall be given only when not practicable or customary to show otherwise. All valves, pipe, fixtures and fittings shall bear the manufacturer's trademark or identifying markings.

G. All materials of similar class or service shall be of one manufacturer.

H. Plumbing piping layouts as shown on the drawings are subject to modifications, by contractor, without extra cost as required to clear other items of construction. This contractor shall coordinate

the work of this section with that of other sections as to avoid interferences by other crafts involved.

I. Contractor shall visit site prior to bidding and fully acquaint himself with all conditions affecting installation of the proposed system. Failure to do so shall not relieve contractor of responsibility of providing complete, operational, and acceptable system.

3.04 COMPLETION

A. When the installation is complete and adjustments specified herein are made, the system shall be operated for a period of one week, during which time it shall be demonstrated to the Mechanical Engineer as being completed and operating in conformance with these specifications.

B. Record as-built drawings showing locations and size of all plumbing piping, fixtures, and equipment as installed shall be kept up-to-date and available for inspection at all times during construction. These shall be signed by the General Contractor and Plumbing Contractor to certify their accuracy and shall be submitted to the owner prior to final acceptance of the work.

***** END OF SECTION *****

SECTION 15600 - HEATING. VENTILATING AND AIR CONDITIONING

PART 1 -- GENERAL

1.01 SCOPE

Work of this section includes everything necessary and incidental to completing heating, ventilating, and air conditioning work; except as herein specifically excluded

The contractor shall be required to provide a complete hearing, ventilating, and air conditioning system for the entire Recreation Center Building. The contractor shall be responsible for preparation and submittal of Title 24 calculations as a part of the heating, ventilating, and air conditioning system.

1.02 GENERAL REQUIREMENTS

A. All core drilling, cutting, and patching for the installation of work under this section shall be performed under this section of the specifications. No holes will be allowed in any structural members without the written approval of the Architect.

B. Guarantee: Furnish a written guarantee form as stipulated in section "General Conditions," for a period of one (1) year from date of acceptance of work by the owner.

C. Materials:

1. All materials and equipment shall be new and in perfect condition when installed, of the best grade and of the same manufacturer throughout for each class or group of equipment. Materials not identified by name or manufacturer shall be comparable to that specified and as approved by the Architect. Maintain adequate job protection for all materials, equipment and work of other trades. Store all pipe at least four inches (4") above grade to avoid contact with water and dirt.

2. Unless otherwise directed by the Mechanical Engineer in writing, or specified or indicated, all materials, and equipment shall be installed in accordance with manufacturer's recommendations and instructions.

3. Mechanical equipment shall bear the manufacturer's label nameplate showing all performance characteristics. All valves, pipe fittings, etc., shall bear the manufacturer's trademark or identifying markings.

4. All materials of similar function or service shall be of one manufacturer.

D. Approval of Materials:

1. Within thirty (30) days after award of the contract, submit to the Architect, six (6) copies of a complete list of material and equipment proposed for the job including rating and capacity data, sizes, grade, electrical data, part or catalog number, manufacturer's name, pictures, catalog cuts, etc.

2. Submit with the above list, six (6) copies of complete shop drawings for all fabricated equipment and six (6) copies of complete control diagrams with descriptions and details.

3. Safety Compliance: All materials, equipment and installation shall comply with the requirements of "Occupational Safety and Health Act" (OSHA) Standards.

E. Verification of Dimensions:

1. All indicated dimensions are approximate and are given for estimating purposes only. Before proceeding with the work, this contractor shall carefully check and verify all dimensions, sizes, required clearances and shall assume full responsibility for the fitting of all equipment and materials herein required to other parts of the work and to the work of other trades.

2. The drawings are essentially diagrammatic to the extent that all offsets, bends, special fittings and locations are not exactly located.

F. This contractor shall comply with all contract documents in laying out his work and equipment. He shall coordinate the work of this section with the work of other trades and all job conditions.

1. The installation of valves, thermometers, gauges, dampers, duct access doors or other indicating equipment or specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

2. Where wall and ceiling access doors are required for access to mechanical equipment, doors shall be furnished arid installed under other sections. Coordinate this requirement with appropriate section of specifications.

G. Rough-in: Rough-in and final connections shall be provided for equipment furnished under other sections and by the owner in accordance with rough-in drawings furnished by others. Future equipment, as noted on the drawings, shall be provided with all required rough-in utilities.

H. Machinery Guards: All moving parts of machinery, such as shaft couplings, belt drives, etc., shall be adequately covered with removable metal guards to protect personnel from possible injury. Guards shall be furnished by the equipment manufacturer and shall comply with applicable requirements of applicable state agencies and OSHA.

1.03 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.04 SUBMITTALS AND TESTS

A. Requirements and Submittals:

1. Conformation to requirements of Uniform Mechanical Code-1995 Edition, local and/or State codes and/or Ordinances, including the Uniform City and County Building Codes, State County and Local Health Department Ordinances, State of California Industrial Accident Commission Safety Orders.

2. Apply and pay for all permits, fees, inspections, examinations and tests required by any legally constituted authorities.

3. Submission of six (6) brochures containing certified manufacturer's drawings and cuts of all equipment and specialties within thirty (30) days after Contract is signed. Partial or incomplete submittals will be rejected and will be returned to Contractor for re-submittal.

a. Submittals shall be in a neat ring binder form and shall contain a complete list, in index form, of the manufacturer's names, cuts of equipment, performance data, catalog numbers and trade names; as required; to properly identify the materials and equipment to be furnished under these specifications.

b. Data submitted for each item shall be properly identified by reference to item number of paragraphs in the specifications and mechanical drawings' equipment schedule designation.

c. Any deviation from item as specified shall be clearly indicated on the submittal and noted as such.

d. These specifications and accompanying drawings specify and illustrate equipment and materials deemed most suitable for the service anticipated. This is not to preclude other products equally as good and efficient. The contractor

shall prepare his bid on the basis of the particular equipment and materials specified for the purpose of determining the low bid. The awarding of the contract shall constitute a contractual obligation to furnish the specified equipment and materials.

e. After the execution of the contract, should the contractor desire to substitute equipment other than that specified in the contract documents, such substitution will be considered for one reason only: The equipment proposed for substitution is superior in construction and efficiency to that specified herein.

f. In the event the contractor obtains the Engineer's approval of equipment other than that herein described; he shall, at his own expense, make any changes in the structures, buildings, or piping necessary to accommodate the equipment and shall furnish record drawings to the Engineer.

g. It will be assumed that the cost to the contractor of the equipment proposed to be substituted is less than that of the equipment specified in the contract documents; and, if the substitution is approved, the contract price shall be reduced by an amount equal to the savings.

B. AIR SYSTEMS TEST AND BALANCE

1. Work under this section shall include complete and total balancing of all equipment air systems.

2. This contractor shall procure the services of an independent Air Balance and Testing Agency, approved by the Engineer, which specializes in the balancing and testing of heating, ventilating, and air conditioning systems. All work of this agency shall be done under the supervision of a qualified Heating and Ventilating Engineer employed by them. All instruments used by this agency shall be accurately calibrated and maintained in good working order. Should the Contractor refuse of neglect to make tests necessary to satisfy Architects that requirements of Specifications and Drawing are met, such tests may be made by an independent testing company with the Contractor charged for all expenses.

3. Air balance and testing shall not begin until system has been completed and is in full working order. The contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.

4. Testing and Balancing: The air balance agency shall perform the following tests and balance systems in accordance with the following requirements:

a. Test and adjust belt drive blower RPM's to design requirements.

b. Test and record each motor full load ampere reading.

c. Make pilot traverse of main supply, return and exhaust ducts and obtain design CFM at fans.

d. Test and record system static pressures, suction and discharge.

e. Adjust main exhaust and return air ducts to proper design CFM.

f. Adjust all zones to proper design CFM, supply and return.

g. Test and adjust each diffuser, grille and register to within +/-5% of design requirements.

5. After balancing, the contractor shall demonstrate to the Mechanical Engineer, that the system is in balance and shall spot-check diffusers and registers at random to ascertain proper air delivery.

6. In preparing balance reports, contractor shall record information as required on ABC test sheets, No’s 82020, 82030, 82033, 82035, 82040, 82100, 82101 and others as required.

7. In cooperation with the controls manufacturer's representative, set adjustments of automatically operated dampers to operate as specified, indicated, and/or noted.

8. All diffusers, grilles, and registers shall be adjusted to minimize drafts in all areas. As a part of the work of this contract, the air conditioning contractor shall make any changes in the pulleys, belts and dampers required for correct balance as recommended by the air balance agency.

PART 2 -- PRODUCTS

2.01 SHEET METAL

A. Layout: Drawings are in part diagrammatic and are intended to convey the scope of work and indicate the general arrangement of equipment, ducts and piping. Mechanical trades shall follow these drawings in laying out their work, consult general construction drawings to familiarize themselves with all conditions affecting their work and shall verify spaces in which their work will be installed. Where job conditions require changes in indicated locations and arrangement, make such changes at no additional cost to owner.

B. Description: Includes sheet metal plenums, ductwork, manually operated dampers and equipment connections.

C. Material: All sheet metal shall be fabricated of galvanized steel.

D. Low Pressure Duct Construction: Gauges, transverse joints, spacing of joints and intermediate bracing shall be as tabulated below, in which transverse joints are shown SS for S-stop, DS for drive slip, PS for pocket slip, and BS for bar slip. PS and BS lapped and riveted at corners. Intermediate bracing where shown may be omitted if duct sections of four feet (4'0") or less are used. Maximum spacing of bracing--four feet (4'0")

1. Schedule:

Shape	**Size (in.)**	**Gauge**	**Transverse Joint**	**Bracing**
Rect.	Up to 12	26	DS, SS	None
Rect.	13 to 18	24	DS, SS	None
Rect.	19 to 30	24	DS, SS	None
Rect.	31 to 42	22	1" PS, or BS	l x l x l-l/8
Rect.	43 to 54	22	1 1/2" standing seam	1.5 x 1.5
Round	Up to 9	24	2" slip	None
Round	9 to 14	24	4" slip	None
Round	14 to 23	22	4" slip	None

2. Alternate Transverse Joint: For rectangular duct sizes nineteen inches (19") and above, in lieu of the joint construction specified in Schedule 1 above, an alternate joint construction in "Ductmate" shall be acceptable. Submit shop drawings for approval.

3. Stiffening: Panels twenty inches (20") and larger shall be cross-broken unless standing seams are used and are spaced closer than thirty-six inches (36").

4. Changes in Direction and Size: Elbows with throat radius 75~ of the dimension of the adjacent duct as otherwise detailed. Ducturns used where indicated. In ducts twenty inches (20") wide or less, use Barber-Coleman ducturns or as approved. Transitions with lengths not shorter than those shown; minimum length of three feet (3'0") where not indicated. Round elbows shall be of 4-piece construction. Same gauge as adjacent duct.

Round "Wye" fittings to have 45-degree side take-off tapped into reducing transition. Seal all joints as specified below.

5. Joints: Airtight for the purpose intended. Seal all joints with high pressure, flexible duct sealant with pressure tests to 10" of water column. Sealant shall be as manufactured by "Glenkote" or approved equal. Alternately, ductwork may be sealed with 6 oz canvas strips and Arabol. Pittsburgh lock or double seams excepted. Arabol shall be used full strength with no dilution. Duct tape shall not be used.

6. Supports: Ducts secured against displacement and vibration. Anchor to structural parts of building at intervals not greater than ten feet (10'0") and suspend with hanger straps. All supports shall be per SMACNA Standards. Submit shop drawings for approval.

7. Manual Dampers: Install where shown: manually operated, opposed blade dampers with interlocking edges, fabricated of 18-gauge steel and equipped with locking quadrants and end bearings. Duro Dyne SRH-228 damper regulators shall be installed on dampers in lined duct; SRST-l on wrapped duct, with proper offset for duct insulation. Each damper regulator rod, Duro Dyne model "SB." Submit shop drawings for approval.

8. All round "Wye" fittings shall include a manual volume damper with locking quadrant. Dampers shall be "Duro Dyne" JDS series or equal. Submit shop drawings for approval.

9. Turning vanes shall be double wall type. No exceptions.

10. Turning vanes in ducts twenty inches (20") wide and larger shall be double wall with perforate inner face and packed with fiberglass. Use "Sonoturn" or equal. Submit shop drawings for approval.

11. Register Boxes: Sheer metal register boxes shall be provided for all ceiling diffusers and registers with round duct connections. Register boxes shall be lined with one inch (1") duct liner and be complete with round starter collar, size as indicated on drawings. Submit shop drawing for approval.

12. Flexible ductwork shall be "GlassFlex" AVC-180 or equal, UL-181 Class I air duct, material tested and labeled with a flame and smoke raring of 25/50 or lower. The duct shall have R-4.5 fiberglass insulation and a 0.17 perm vapor barrier. Maximum length shall not exceed five feet (5'0"). Submit shop drawings for approval

13. The contractor shall verify all clearances on job prior to fabricating ductwork. Provide transitions and offsets as required to install the work and coordinate all clearances with other trades.

14. Provide "Duro Dyne" model TH-1 instrument port in each supply and return trunk for each specified system. Submit shop drawings for approval.

2.02 DUCT INSULATION

A. Line all ductwork where specified below with one inch (1") 1.5 PCF density moisture-resistant, fire-resistant, glass, sound absorbing duct liner. Liner shall be cemented to duct with "3M" #EC-104 adhesive. Where widths of ducts or casings exceed twenty inches (20"), both mechanical fasteners eighteen inches (18") on centers and adhesive shall be used. Exposed edges securely cemented to prevent fraying. Dimensions of ducts are net inside liners. Manufacturer shall be "Manville" Linacoustic R or approved equal. Flame spread not over 25. Smoke developed not over 50. Liner shall meet all of the requirements of NFPA 90A & 90B. Submit shop drawings for approval on method of fastening and material.

1. All supply, return, and exhaust plenums.

2. Line all ductwork from inlet of exhaust fans upstream for a developed length of twenty feet (20'0") from the fan.

3. Line all register boxes with one-inch (1") duct liner.

4. In additional locations where shown on drawings.

B. Wrap all unlined ductwork in uninsulated or unconditioned areas with 1 ½", .75 pcf fire-resistant moisture resistant fiberglass insulation duct wrap. Insulation package shall have a flame spread rating of 25, and a smoke developed factor of 50 and shall meet all of the requirements of NFPA 90A & 90B. Duct wrap insulation shall consist of a blanket of glass fibers factory laminated to a reinforced foil vapor retarder facing with a 2" min. stapling and taping flange on one edge.

1. Duct wrap shall not exceed 25% compression during installation and shall carry an R-value of 4.2 installed.

2. Duct wrap sections shall be tightly butted to adjacent sections with the 2" flap overlapping the adjacent section. All joints to be stapled and taped with pressure sensitive tape matching the insulation facing, FRK backing stock or glass fabric and mastic. Seal all tears, punctures and other penetrations of the duct wrap facing with tape or mastic to provide a vapor-tight system.

3. Insulation shall be as manufactured by "Owens-Corning, or equal in "Manville" or "Armstrong".

4. Duct wrap shall be secured with #16 soft galvanized wire, spaced at twelve-inch centers. . No raw edges exposed will be acceptable.

2.03 CEILING DIFFUSERS AND REGISTERS

A. Performance:

1. Devices shall provide the required air throw and spread with no apparent drafts or excessive air movement within the ventilated or air conditioned area.

2. All air distribution accessories required to effect these conditions shall be provided and installed by this contractor.

3. Diffusers, grilles and registers causing excessive air movement, drafts or objectionable noise shall be replaced at no cost to the owner.

B. Ceiling Diffusers:

1. Diffusers shall be modular, removable core type, with adjustable volume control dampers.

2. Furnish diffusers in a factory applied, baked enamel finish. Color as selected by the Architect.

3. Diffusers shall be as manufactured by "Metalaire" Series 9000 MOD-FLO modular adjustable air diffusers, aluminum construction, or equal in "Anemostat."

4. Verify frame types prior to ordering. Submit Shop Drawings, including color samples, for approval.

5. Provide in the neck at each diffuser at duct takeoff from main duct, an adjustable type air extractor and volume controller. Submit shop drawings for approval.

6. Where air distribution devices are installed in lay-in ceilings, twenty four by twenty four (24" x 24") filler panel shall be provided. For ceiling diffusers larger than 24" x 24" (i.e. 30" x 22"), provide properly sized filler panel.

C. Sidewall Diffusers:

1. Diffusers shall be extruded aluminum linear bar grilles with sizes as shown on plans.

2. Deflection bars shall be 15° in a permanently fixed position.

3. Borders shall be 1" wide.

4. Grille and register sections shall be furnished in one piece up to 6 feet in length.

5. Bar Grille borders shall be mechanically fastened to provide a neat hairline corners.

6. Furnish all grilles with opposed blade dampers.

7. Grilles shall have a natural anodized finish, and shall be as manufactured by Metal*Aire or approved equal in “Anemostat” or “Titus”.

D. Return/Exhaust Registers:

1. Registers shall be aluminum construction with key operated, opposed blade, volume Dampers.

2. Furnish all registers with a factory applied, baked enamel finish. Color as selected by the Architect.

3. Registers shall be as manufactured by "MetalAire" Model RH, or equal in "Anemostat."

4. Verify frame types prior to ordering. Submit shop drawings, including color samples, for approval.

5. Where registers are installed in lay-in ceilings, twenty four by twenty four (24" x 24") filler panel shall be provided. For return/exhaust registers larger than 24" x 24" (i.e. 30" x 22"), provide properly sized filler panel.

2.04 PACKAGED ROOF MOUNTED AIR CONDITIONING UNIT (GAS HEAT)

A. General:

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a scroll or reciprocating compressor for cooling duty and gas combustion for heating duty. Unit shall discharge supply air downward as shown on contract drawings. Units shall be manufactured by Carrier or approved equal. Substitute manufacturers shall meet all ratings on drawings, including SEER, cooling BTUH, and heating AFUE. Any substitute product not meeting any of the stated performance and efficiency ratings on the drawings shall be rejected.

B. Design Standards:

1. Unit shall be rated in accordance with ARI Standards 270 and 360. Designed in accordance with UL Standard 1995.

2. Unit shall be designed to conform to ANSI/ASHRAE 15.

3. Unit shall be UL tested and certified in accordance with ANSI Z21.47 Standards and CSA or CGA certified as a total package.

4. Unit casing shall be capable of withstanding Federal Test Method Standard 141 (Method 6061) 500-hour salt spray test.

C. Setup and Handling:

1. Unit shall be stored and handled per manufacturer's recommendations.

D. Cabinet:

1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a pre-painted baked enamel finish.

2. Indoor blower compartment interior cabinet surfaces shall be insulated with a minimum 1/2 in. thick, flexible glass fiber insulation, coated on the air side. Aluminum foil faced glass fiber insulation shall be used in the furnace compartment.

3. Cabinet panels shall be easily removable for servicing.

4. Filters will be accessible through a hinged access panel.

5. Holes shall be provided in the base rails for rigging shackles to facilitate overhead rigging.

6. Unit shall have a factory-installed internal condensate drain trap providing a minimum 3/4-in. connection. Drain shall allow for no standing water accumulation per AHSRAE 62. Substitute manufacturers shall provide proof of compliance with ASHRAE 62.

E. Fans:

1. Indoor Blower (Evaporator Fan):

a. All fans shall be belt driven and include an adjustable- pitch motor pulley.

2. Condenser Fans shall be of the direct driven propeller type with corrosion-resistant blades riveted to corrosion-resistant steel supports. They shall be dynamically balanced and discharge air upwards.

F. Compressor:

1. Hermetic type shall be factory rubber shock mounted and internally spring mounted for vibration isolation.

2. Factory-installed crankcase heater to prevent refrigerant dilution of oil.

G. Coils:

1. Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.

H. Heating Section:

1. Induced draft combustion type with energy saving direct spark ignition system and redundant main gas valve.

2. The heat exchanger shall be of the tubular section type constructed of minimum of 20-gauge steel coated with a nominal 1.2-mil aluminum-silicone alloy for corrosion resistance.

I. Refrigerant Components:

1. Fixed expansion device with filter driers.

J. Filter Section:

1. FARR 30% disposable 2 inch filter or equal installed separately in RA duct and economizer outside air intake.

K. Controls and Safeties:

1. Unit Controls: Unit shall be complete with self-contained low-voltage control circuit protected by a manually resetable circuit breaker on the 24V side.

a. Economizer Control

b. Capacity control

2. Safeties:

a. Unit shall incorporate a solid-state compressor protector which provides reset capability at the space thermostat, should any of the following safety devices trip and shut off compressor:

1. Compressor over temperature, over current.

2. Low-pressure switch.

3. Freezestat, evaporator coil.

4. High-pressure switch.

b. Heating section shall be provided with the following minimum protections:

1. High temperature limit switch.
2. Induced draft motor centrifugal switch.
3. Flame rollout switch (manual reset).
4. Flame proving controls.
5. Redundant Gas valve.

3. Operating Characteristics:
   a. Unit shall be capable of starting and running at 115 degrees F ambient outdoor temperature per maximum load criteria of ARI Standard 360.
   b. Compressor with standard controls shall be capable of cooling operation down to 25 degrees F outdoor ambient temperature.
   c. Unit provided with fan time delay to prevent cold air delivery before heat exchanger warms up.
4. Electrical Requirements:
   a. All unit power wiring shall enter unit cabinet at a single location.

L. Special Features:
1. Roof Curb: Formed 18 gauge galvanized steel shipped completely assembled with wood nailer strip, welded corners, and integral 2-in. spring isolation. Minimum curb height shall be 14 inches, including the spring isolation.

M. Integrated Economizer:
1. Integrated, fully modulating type field-installed capable of simultaneous economizer and compressor operation, to provide cooling with outside air.
2. Economizer shall be installed within the unit cabinet and equipped with centrifugal fan powered exhaust fan.
3. Provide FARR 30% disposable filter for OSA filtration.
4. Provide solid-state dual enthalpy control.

2.05 EXHAUST FANS (CEILING MOUNTED)

A. General
1. Fan shall be direct driven, ceiling mounted, with centrifugal blower.
2. See equipment schedule for capacities and duty of each exhaust fan to be provided and plans for layout details.
3. Fans shall be U.L. Listed and all electrical components shall carry the listing and comply with the State of California Electrical Code.
4. Fans shall be as manufactured by "Cook," or approved equal in "Greenheck" or "Penn."

B. Quality Assurance
1. Exhaust fans shall be design certified by AMCA.
2. All fans shall be statically and dynamically balanced.

C. Construction
1. The drive frame, bearing, and motor plates shall be constructed of mild gauge steel.

D. Motors

1. Motors shall be heavy duty, 1750 RPM, open drip-proof, horsepower and voltage as indicated on equipment schedule.

2. Motors shall be equipped with permanently lubricated, sealed ball bearings.

2.06 AUTOMATIC TEMPERATURE CONTROLS

A. Description: A complete system of automatic controls installed to control the equipment, consisting of a system of electronic and/or electric controls to provide the heating, ventilating and air conditioning results specified, as intended, and as shown on the drawings. All controls provided shall be the responsibility of a single manufacturer. The contractor shall furnish and install such additional material, equipment and appurtenances as required to make satisfactory operating Systems.

B. Work Included: The Mechanical Contractor shall be responsible for furnishing all the automatic temperature control devices as shown on the plans. He shall secure the services of the temperature control manufacturer to install all temperature control devices, except those specified as being furnished with other equipment. The temperature control manufacturer shall also-

1. Submit shop drawings of proposed temperature control system showing electrical interlocks with all mechanical equipment, list of materials being furnished, and a detailed description of the control sequence. These shop drawings shall completely show, in detail, all wiring, both control and power, for all heating and air conditioning equipment and systems. Failure to provide complete submittal will result in rejection of the product.

2. Instruct the electrician, sheet metal worker, and pipe fitter on the particular requirements of control devices for which each is responsible.

3. Calibrate all devices and make all final settings and test out control system under actual operating conditions for satisfactory operation.

4. Deliver and hang a copy of the control diagram, material list and control sequence, inclusive, on a permanent type of print, framed behind glass and mounted as directed by the Architect in the field. All control devices on the diagram shall be clearly labeled as to location and function.

5. Contact operating personnel, instruct them on the operation and maintenance of the control system and provide as hereinafter specified.

6. All low voltage wiring shall be furnished and installed by the Mechanical Contractor. Conduit for low voltage wire shall be furnished and installed under the Electrical Section of the specifications.

C. Work Not Included: All line voltage wiring, including conduit shall be under the Electrical Section of the specifications.

2.07 EQUIPMENT IDENTIFICATION

Equipment

1. Stenciled identification for each piece of equipment installed.

2. Equipment identification tags to match plan numbers.

3. Submit equipment stenciling for approval by Mechanical Engineer, prior to installation.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 EQUIPMENT

A. Regulation, Operation and Instruction

1. Lubricate all bearings in accordance with manufacturer's recommendations and instructions.

2. Check operation of all pumps, fans, motors, etc.

3. **T**he services of a qualified technician shall be made available for a continuos period of not less than seventy two (72) hours during business hours, at a time convenient to the owner to place the entire system into operation, supervise its operation, make all tests and adjustments, correct any and all defects and deficiencies and thoroughly instruct the owner's operators in the proper operation and maintenance of the entire system. Furnish complete test reports including all motor currents, static pressures, temperatures, fan speeds, and CFM to the Architect for review by the Mechanical Engineer.

4. Furnish any additional operation, labor, and material that may be required during guarantee period.

5. The contractor shall, during the guarantee period, and as directed by the owner, make any additional tests, adjustments, etc., that may be required and correct any deficiencies arising from the operation of the system.

3.03 OPERATING AND MAINTENANCE DATA

Data: Submit to the Architect for approval, prior to acceptance of the installation, complete and at one time. Partial or separate data will not be accepted. Data shall consist of the following--

1. Manufacturer's Literature: Six (6) copies of manufacturer's instructions for operation and maintenance of all equipment, valves, and controls; including replacement parts lists.

2. Written Instruction: Typewritten instruction for operation and maintenance of the system composed of Operation Instructions and Maintenance Instruction. Six (6) copies submitted to the Architect for approval.

a. Operating instructions shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions.

b. Maintenance instructions shall list each item (i.e. controls and mechanical equipment) requiring inspection, lubrication, or service and describe the performance of such maintenance.

3. Verbal Instructions: Operating personnel shall be instructed in the operation of the systems in accordance with typewritten instructions. No other verbal instructions shall be given.

4. Binders: Four (4) complete sets of the above data in looseleaf, ring type binders with permanent covers, with identification on inside cover.

3.04 SPECIAL REQUIREMENTS

A. The manufacturer and/or supplier of all equipment shall certify in writing to the owner that this equipment complies with these specifications.

B. All new equipment shall be anchored as required and/or as detailed on drawings.

C. Written Certifications, in a form approved by the Mechanical Engineer shall be provided by the equipment manufacturer or his authorized representative:

1. That the equipment and its installation was inspected on the job by the manufacturer and that the equipment is in first-class condition throughout, was installed in accordance with manufacturer's requirements and recommendations, and that the installation is approved by the manufacturer.

2. That the equipment is operating in a safe and satisfactory manner and is delivering capacities and performance hereinbefore specified and/or indicated on the drawings.

D. The following shall be certified as described above: Air-conditioning systems, evaporative coolers, suspended gas heaters, and exhaust fans.

E. Damage by Leaks: The contractor shall be responsible for all damage to equipment and premises caused by leaks or breaks in piping or equipment for a period of one (1) year after date of final acceptance.

F. Unless otherwise directed, and/or specified, and/or indicated, all materials and equipment shall be installed in accordance with the manufacturer's recommendations and instructions.

G. Mechanical equipment shall bear the manufacturer's label or nameplate showing performance characteristics. Identifying size or model number shall be given only when not practicable or customary to show otherwise. All valves, pipe, and fittings shall bear the manufacturer's trademark or identifying markings.

H. All materials of similar class or service shall be of one manufacturer.

I. Duct layout as shown on the drawings is subject to modifications, by contractor, without extra cost as required to clear other items of construction. This contractor shall coordinate the work of this section with that of other sections as to avoid interferences by other crafts involved.

J. Contractor shall visit site prior to bidding and fully acquaint himself with all conditions affecting installation of the proposed system. Failure to do so shall not relieve contractor of responsibility of providing complete, operational, and acceptable system.

3.05 COMPLETION

A. When the installation is complete and adjustments specified herein are made, the system shall be operated for a period of one week, during which time it shall be demonstrated to the Mechanical Engineer as being completed and operating in conformance with these specifications.

B. Record as-built drawings showing locations and size of all pipe and ducts as installed shall be kept up-to-date and available for inspection at all times during construction. These shall be signed by the General Contractor and Heating, Ventilating, and Air Conditioning Contractor to certify their accuracy and shall be submitted to the owner prior to final acceptance of the work.

END OF SECTION

SECTION 16000 - ELECTRICAL

PART 1-- GENERAL

1.01 SCOPE

A. Provide all labor, materials, and equipment required to complete the electrical work shown on the Drawings and specified herein.

B. A brief outline of these requirements includes, but is not limited to the following:

1. Underground conduits, pullboxes, pads, vaults, etc. for power
2. Electrical distribution equipment including switchgear
3. Complete interior and exterior lighting, power, telephone, and cable television systems including branch circuit distribution as indicated.

1.02 LISTINGS AND CODES.

A. All electrical materials and equipment shall be new and shall be listed by Underwriters Laboratories (UL) and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have a listing. In addition, the materials, equipment, and installation shall comply with the requirements, where applicable, of the latest edition of the following:

1. National Electrical Manufacturers Association (NEMA)
2. American Standard Association (ASA)
3. National Fire Protection Agency (NFPA)
4. American National Standard Institute (ANSI)
5. California Code of Regulation, Title 24 (CCR)
6. National electrical code (NEC)
7. All local and state codes having jurisdiction

B. In cases where the codes have different levels of requirements, the most stringent rule shall apply.

1.03 SHOP DRAWINGS.

A. Contractor shall submit to the architect for approval six (6) sets of a complete list and catalog cuts of all materials he proposes to provide for the electrical systems covered by these drawings. Each electrical item shall be identified by the manufacturer and trade name of the item as well as the description given on the electrical engineers plans. Unless otherwise specifically authorized by the electrical engineer, make all submittals in groups containing all associated items. The electrical engineer may reject partial submittals as not complying with the provisions of this section. No materials shall be delivered to the job until the list has been approved by the engineer. Acceptance or rejection of substitute materials shall be at the discretion of the engineer.

B. Make all submittals in accordance with the general contractor's schedule of shop drawings and far enough in advance of scheduled dates of installation to provide required time for reviews, securing necessary approvals, possible revision and resubmittal, including placing orders and securing delivery.

1.04 LOCATIONS AND ACCESSIBILITY.

Work specified and not clearly defined by the Drawings shall be brought to the attention of the electrical engineer prior to installation so that it may be installed and arranged in a satisfactory manner.

1.05 TESTING AND ADJUSTMENT.

A. Upon completion of electrical work, adjust and test circuits, lights and other electrical items to insure

proper operation of all electrical equipment.

B. Check service voltages under maximum obtainable loads. Equipment, fixtures, and parts found to be in need of correction during such testing shall be immediately repaired or replaced with new equipment and that part of the system shall be retested. Such replacement or repair shall be done at no additional cost to the owner.

C. All failures shall be corrected in a manner satisfactory to the engineer. The contractor shall furnish all necessary costs of retesting equipment and correcting failures.

D. All electrical tests shall be witnessed by an inspector that shall have experience in electrical work, equal to that of an electrician having at least five (5) years experience as an I.B.E.W. journeyman.

1.06 LAYOUT AND INSTALLATION.

Layout and installation of electrical work shall be coordinated with the overall construction schedule and work schedule of various trades, to prevent delay in the completion of the project. Complete Drawings for the entire project shall be available at the job site. It shall be obligatory to thoroughly check these documents before organizing the electrical work schedule or installing material and equipment.

1. The electrical Drawings are diagrammatic in nature and indicate the preferred locations of outlets and equipment, and are to be followed as closely as possible. It is not within the scope of the Drawings to show all bends, offsets, pullboxes, and obstructions and it shall be the responsibility of the contractor to include such in the bid. The Drawings are not intended to be scaled, and the contractor shall refer to the architectural and structural Drawings for dimensions and limitations of the building structure, and to the mechanical Drawings for the location of equipment requiring electrical service and connections.

2. In the event that changes in the indicated locations or arrangements are necessary due to field conditions, such changes shall be made by the contractor without extra costs, providing the change has been approved by the architect before the work has been commenced and no additional materials are required. Contractor shall advise the architect of any required additional costs and have approval of same before proceeding.

1.07 WARRANTY.

The manufacturer=s standard warranty shall in no event be for a period of less than two (2) years from date of initial start-up of the system and shall include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables filters, and other service items made unusable by the defect) used during the course of repair. Running hours shall not be a limiting factor for the system warranty by either the manufacturer or servicing distributor. Submittals received without written warranties as specified will be rejected in their entirety.

1.08 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

PART 2 -- PRODUCTS

2.01. DISTRIBUTION SERVICE EQUIPMENT AND PANELBOARDS.

A. Panelboards shall as indicated on plans and shall conform to the requirements of the U.L., NEMA standard for panelboards. Fronts shall be finished to resist corrosion with not less than one priming coat and one finishing coat. Exposed parts of trim and doors shall be painted by others after installation. All branch circuit panelboard locks shall be "like keyed" with three keys furnished to owner. Adjacent poles of single pole devices shall be of a different phase with split phase bussing. Circuits shall be numbered from top to bottom with odd numbers on the left and even numbers on the right. The front shall include flush hinged door with lock, covering all breakers.

B. Identification nameplates shall be provided of micarta 1/8" thick, of approved size, with bevelled edges and engraved white letters 1/4" high minimum on black background.

2.02. CONDUITS AND RACEWAYS.

A. All conduits and raceways shall conform to U.L. standards as applicable.

B. Electrical metallic tubing (EMT). No less than 1/2" trade size, 2" maximum trade size. E.M.T. may be used in dry locations only. Shall conform to U.L. standards as applicable.

C. Rigid galvanized steel conduit (RGS). Shall be steel, galvanized or zinc coated full weight, no less than 1/2" trade size. Shall conform to U.L. standards as applicable.

D. Liquid-tight flexible conduit. No less than 1/2" trade size, flexible, galvanized steel core completely encased in a polyvinyl chloride jacket. Shall conform to U.L. standards as applicable.

E. Non-metallic polyvinyl chloride (PVC). No less than 3/4" trade size, schedule #40 unless noted otherwise. Sunlight resistant and rated for 90□ c. Conductors. Shall conform to U.L. standards as applicable.

F. Flexible metallic conduit. No less than 1/2" trade size, steel, formed from continuous strip and zinc coated. Shall conform to U.L. standards as applicable.

2.03. FITTINGS. Fittings and outlets for conduit systems shall conform to the following:

A. Fittings for electrical metallic tubing (EMT) for sizes 1/2" through 2" shall be wrench tightened compression type which shall provide pull-on force resistance and electrical continuity as required by U.L. No indenting fittings or adjustable set screw type fittings shall be used.

B. Fittings for rigid galvanized steel conduit (RGS) shall be steel, threaded fittings only. Split and "set screw" type fittings are not acceptable.

C. Fittings for liquid-tight flexible conduit shall be of the compression type with threaded ferrule, sealing ring and suitable for wet locations.

D. Fittings for PVC shall be non-metallic, sunlight resistant, and of the same compound as the conduits which they are being utilized with.

E. Fittings for flexible metallic conduit shall be of the "squeeze" type with either one (1) or two (2) screws, cast or malleable steel, cadmium or zinc coated.

2.04. CONDUCTORS.

A. Conductor sizes are specified by American Wire Gauge (AWG). Conductors shall be copper. Wire sizes #10 and larger shall be stranded conductor. However, control and signal systems may be wired with #14 stranded. Insulation for wiring shall be 600 volt type "THWN", 75□ c. Rated for dry or wet locations or type "THHN", 90□ c. Rated for dry locations.

B. Conductor sizes shall be as indicated; where sizes are not indicated they shall be as required by code. All wiring shall be color coded for phase identification as follows:

120/208V. 3Phase, 4W.	277/480V. 3Phase, 4W.
Phase A = Black	Phase A = Brown
Phase B = Red	Phase B = Orange
Phase C = Blue	Phase C = Yellow
Neutral = White	Neutral = Grey
Ground = Green	Ground = Green

C. Make splices for conductors #8 and smaller with steel or copper spring insulated wire nuts. Splices for conductors #6 or larger shall be with split bolts or "Kearney's" which when used shall be thoroughly insulated.

D. The green ground wire shown on conduit runs shall run continuous from panel to last outlet. This wire shall be pigtailed in each outlet for connection to box and device so that if the device is removed, the ground will not be interrupted.

2.05. OUTLET BOXES.

Pull boxes shall be sized for the number and size of conductors and conduits entering the box and equipped with plaster/extension rings where required. All boxes shall be labeled to indicate panel and circuit number of conductors contained within. In no case shall any box be less than 4" round or square. Unless specifically noted otherwise, outlet boxes for concealed work shall be galvanized or sherardized, one piece, pressed steel, with knockouts as required.

2.06. PULL BOXES.

Sizes as indicated on the Drawings and per utility company requirements, but in no case of less size or material thickness than required by the governing code in-ground. Pull boxes located in or around vehicular traffic areas shall be provided with traffic rated covers and shall be placed to avoid surface water flow areas. All covers shall be permanently identified as to the type of service contained therein (IE: power, communications, etc.) Above-ground boxes located in damp or wet areas shall be rated NEMA 3R.

2.07. DISCONNECTS.

A. Manual motor starter switches shall be toggle type on/off, as required for control of single and three phase motors and resistance heater loads. Switches shall be side wired and be complete with oversize silver contacts. Shall be U.L. listed as applicable

B. Safety switches shall be heavy-duty industrial type. Switches shall be fused or nonfused as indicated on the Drawings. Enclosures shall be rated either NEMA 1 or NEMA 3R as required by installation. Units shall be quick make, quick break with operating handle which can be padlocked in the "off" position. Finish shall be a standard light gray enamel. Switches shall have affixed to covers, a nameplate indicating what item is controlled by switch.

1. Fuses shall be of correct rating for each installation, and shall be either current limiting or multi-element time delay as required by equipment manufacturers recommendation. Shall be U.L. listed.

A. Sealing of devices in hazardous areas are to be treated per NEC Article 500

2.08. PULL WIRES.

Install an unspliced pull line in all empty conduits. Pull line shall be a 3/16" braided polypropylene line.

2.09. GROUND RODS.

Provide steel centered copper clad ground rods as required per NEC 250. Minimum length shall be 3/4" x 8', driven nearly full length into the earth with no more than 2" left above grade for proper connection to the grounding conductor(s). The resistance of a made electrode must comply with NEC 250-36.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 GENERAL.

Any cutting, patching or finish repair of the work or work of other trades necessary for the installation of the

electrical work shall be provided under this section.

3.03 MISCELLANEOUS.

A. Provide trenching, concrete encasement when required, backfilling and compaction for all underground conduits and/or structures. Compaction must meet General Contractor requirements.

B. Provide footings for all post and/or pole-mounted lighting fixtures: concrete shall conform to the applicable sections of this specification and local codes having jurisdiction.

C. Structural and miscellaneous steel used in connection with electrical work and located out-of-doors or in damp locations, shall be galvanized unless noted otherwise. Included are underground pullbox covers, unistrut bracing and similar electrical items.

D. Flashings shall be provided at all points where conduit or other electrical components penetrate the roof. Flashings shall extend a minimum of 5" above the surrounding roof surface with weatherproof mastic applied, to prevent moisture or dust from entering the opening. Flashings shall be delivered to the roofing contractor for installation. The correct location of all such penetrations shall be verified by the contractor.

E. Provide sleeves under walls, concrete footings and foundations. Sleeves shall have an inside diameter of not less than 1" larger than the outside diameter of conduit contained therein.

3.04 CONDUIT.

A. Conduit for line voltage wiring shall be concealed within finished walls, ceilings and under/in floors. Exposed conduits above ceilings and surface mounted in mechanical and service areas shall be installed parallel or perpendicular to the building walls. Right angle turns shall consist of conduit bodies or symmetrical bends. All conduits shall be properly secured with components specifically manufactured for this use. All conduits shall be sized in accordance with fill capacities set forth in NEC Article 348.

B. Electrical metallic tubing (EMT), Do not embed EMT in concrete or below grade. EMT may be used where concealed or where not subject to damage.

C. Rigid galvanized steel conduit (RGS) shall be used in mechanical rooms, where conduit passes through concrete slabs on grade and where subject to physical damage.

D. Flexible metallic conduit shall be used for final connections to all vibrating and mechanical equipment. A code gauge green insulated equipment grounding conductor shall be installed in such conduits. Flexible metallic conduit may be used in length's of less than 6' for connecting fixtures, provided that a code gauge insulated grounding conductor is provided. Liquid-tight flexible conduit shall be used for all damp or wet locations.

E. Polyvinyl chloride conduit (PVC) shall only be used underground at depth per code, unless otherwise noted, below finished grade when not installed under a concrete slab or footing. Provide a code gauge green ground wire in all PVC runs. All underground conduit runs shall terminate with pre-manufactured bell ends at all manholes and pull boxes.

F. Conduit ends shall be cut square and shall be carefully reamed out to full size with a tapered burring reamer and shouldered to the fittings.

G. Bends in conduit shall be made so that the conduit will not be damaged, and that the internal diameter of the conduit will not be effectively reduced. The radius of the curve of the inner edge shall not be less than shown in table 346-10 of the NEC.

H. Conduit supports shall be provided for all above ground systems. Conduit shall be securely supported and fastened per the NEC and local jurisdiction

I. Conduit shall not run closer than 6" to any hot water pipe, steam pipe, heater flue, or vent.

J. Condulets shall be used where conduit runs must go around outside corners of walls, beams, equipment, etc. All condulet covers shall be accessible.

K. All conduits entering or leaving the building shall be sealed per NEC requirements.

L. All conduits entering the building from a hazardous area must be sealed per NEC Article 500.

3.05 CONDUCTORS AND TERMINATIONS.

A. Wire and cable shall be continuous from outlet to outlet, with the splices only in junction boxes, gutters, equipment or other approved locations.

B. Make splices, joints, taps and connections to equipment with approved solderless lugs sized for the wire or conductor involved.

C. Identify power and lighting feeders with permanent tags at panels, pull boxes and points where conduit run is broken.

D. Installation. Thoroughly clean conduit and wireways to insure all parts are perfectly dry before pulling wires. Use approved wire pulling compound for sizes #2 or larger, and on long runs.

E. Wire or cable bends in junction and/or pullboxes shall be made with a long radius. Bends for cable shall have a radius of not less than 8 times the diameter of the cable. Per N.E.C. Section 300-34.

F. Conductors #12 and smaller shall be provided with eye or forked type compression set connectors when conductors are terminated on a set screw type terminal.

3.06 DEVICE AND JUNCTION BOXES.

A. Concealed outlet boxes shall be accurately placed, flush with the finished surface of wall or ceiling, unless otherwise indicated. They shall be plumb and rigidly fastened to the structure, independent of the conduit, by a bar hanger or strap approved for that particular use.

B. Outlet boxes in furred ceiling shall be rigidly fastened to the supporting structure by an approved bar type hanger or blocking.

C. Control apparatus, outlet boxes, junction and/or pullboxes, and other similar equipment shall be installed and maintained in accessible positions and locations.

D. Wall outlets shall not be wired back-to-back, boxes on opposite sides of a common wall shall be separated by a stud. Provide a minimum of 24" of separation in acoustic and fire rated walls.

E. Cast steel or aluminum outlet boxes shall be used for all surface mounting in damp or wet locations. Boxes shall be complete with threaded hubs and weatherproof covers.

F. Provide multi-gang boxes where required, sectional or gangable boxes shall not be permitted.

3.07 GROUNDING.

All Grounding shall be in accordance with NEC Article 250

3.08 IDENTIFICATION.

A. In addition to nameplates and governing codes for switchboards, panelboards, transformers, etc. The following shall be labeled to indicate function or use.

B. Panelboards shall be provided with a typed circuit directory mounted in a holder on the inside of the cabinet door. Nameplates shall be provided for all circuits in the service distribution and branch distribution boards, motor control centers, lighting control panels, separately mounted starting switches, disconnection switches. Motor control push-button stations, selector switches, transformers, terminal cabinets, telephone cabinets, etc. These nameplates shall have the same identification names as indicated on the plans.

3.09 CONNECTIONS TO EQUIPMENT.

The contractor shall connect all owner, mechanical and plumbing contractor supplied equipment requiring electrical connections throughout the building.

3.010 FINISH.

Panelboards shall be finished prime coat on exposed trim and door. Final finish will be determined by architect and provided by others.

3.011 PROTECTION AND RESPONSIBILITY.

The contractor shall protect all work, materials, and equipment from damage. Provide adequate and proper storage facilities during progress of work and be fully responsible for all injury or damage that may occur from any part of his work function.

3.012 CLEAN-UP.

Upon completion of work, and periodically as required for safety and sanitation, remove all trash and debris resulting from work under this section.

3.013 OPERATION AND MAINTENANCE INSTRUCTIONS.

Fully instruct and demonstrate to the owner's operating personnel the performance, operation and maintenance of equipment. The time allowed for said instruction shall be included as part of these contract documents.

3.014 FINAL REVIEW AND ACCEPTANCE.

Upon stated completion of contract, work shall be subject to review by representatives of owner, architect and engineer for adherence to contract Drawings and specifications. Any changes required to bring work into substantial conformance with Drawings and specifications shall be made by the contractor at no additional cost to the owner.

3.015 RECORD DRAWINGS.

Provide and maintain in good order a complete set of electrical contract prints. All changes shall be clearly recorded on this set of prints. At the end of the project, the contractor shall transfer all changes to one set of transparencies for submission to the architect. Accurate complete electrical contract prints shall be provided by the contractor to the architect when requested and at cost of printing. Upon completion of the work, deliver to the architect one complete set of final prints of the transparencies and the transparencies themselves, with complete installation and changes in the work indicated thereon. All sheets shall be dated and initialed by the contractor as being a correct and accurate record of the installation.

END OF SECTION

SECTION 16721 - FIRE ALARM SYSTEMS

PART 1 -- GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes fire alarm systems.

B. Related Sections include the following:

1. Division 08 Section "Finish Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

C. This specification represents industry standard minimum requirements for a complete, proper, approved and operating Fire Protection System. Contractor shall be responsible for a design-build Fire Protection System including compliance with all applicable codes and requirements of the agency having jurisdiction (County of Imperial Fire Department). Contractor to create required drawings and submit to the agency having jurisdiction for plan check and approval and shall acquire a permit and perform all installation, coordination, inspections and testing, as well as provide all materials and services necessary for a complete, approved and operational Fire Protection System.

1.03 DEFINITIONS

A. FACP: Fire alarm control panel.

B. LED: Light-emitting diode.

C. NICET: National Institute for Certification in Engineering Technologies.

D. Definitions in NFPA 72, 1999 Edition, apply to fire alarm terms used in this Section.

1.04 SYSTEM DESCRIPTION

Noncoded, analog-addressable system; automatic sensitivity control of certain smoke detectors; and multiplexed signal transmission dedicated to fire alarm service only.

1. Interface with existing fire alarm system.

1.05 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 72, 1999 Edition, CBC, CFC & Titles 19 and 24 CCR.

B. Fire alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.

3. Flame detectors.
4. Smoke detectors.
5. Verified automatic alarm operation of smoke detectors.
6. Automatic sprinkler system water flow.
7. Fire extinguishing system operation.
8. Fire standpipe system.
9. Duct smoke detectors.
10. Tamper switch
11. Flow switch

C. Fire alarm signal shall initiate the following actions:

1. Alarm notification appliances shall operate continuously.
2. Identify alarm at the FACP and remote annunciators.
3. De-energize electromagnetic door holders.
4. Transmit an alarm signal to the remote alarm receiving station.
5. Unlock electric door locks in designated egress paths.
6. Release fire and smoke doors held open by magnetic door holders.
7. Activate voice/alarm communication system.
8. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
9. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
10. Record events in the system memory.
11. Record events by the system printer.
12. Sound fire sprinkler bell (as applicable)

D. Supervisory signal initiation shall be by one or more of the following devices or actions:

1. Operation of a fire-protection system valve tamper.

E. System trouble signal initiation shall be by one or more of the following devices or actions:

1. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
2. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at the FACP.
4. Ground or a single break in FACP internal circuits.
5. Abnormal ac voltage at the FACP.
6. A break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at the FACP or annunciator.
9. Fire-pump power failure, including a dead-phase or phase-reversal condition.

10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.

F. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP and remote annunciators. Record the event on system printer.

1.06 SUBSTITUTIONS

Substitutions will not be allowed unless otherwise specified on the plans or approved during the submittal phase by the Construction Manager.

1.07 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire alarm system design.

b. Fire alarm certified by NICET, minimum Level III.

2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.

3. Device Address List: Coordinate with final system programming.

4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.

5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.

6. Batteries: Size calculations.

7. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

8. Ductwork Coordination Drawings: Plans, sections, and elevations of ducts, drawn to scale and coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.

9. Voice/Alarm Signaling Service: Equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.

10. Floor Plans: Indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

11. Voltage Drop Calculations

12. Fire alarm devices system equipment list describing functions and CSFM listing number

C. Qualification Data: For Installer.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.

F. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 01 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review.

G. Documentation:

1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.

2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner, Architect, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.

a. Hard copies on paper to Owner, Architect, and authorities having jurisdiction.

b. Electronic media may be provided to Architect and authorities having jurisdiction.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. 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.

1.09 PROJECT CONDITIONS

Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Architect no fewer than fourteen days in advance of proposed interruption of fire alarm service.

2. Do not proceed with interruption of fire alarm service without Architect's and Owner's written permission.

1.010 SEQUENCING AND SCHEDULING

A. Existing Fire Alarm Equipment: Maintain fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of the new fire alarm system, remove existing disconnected fire alarm equipment.

1.011 EXTRA MATERIALS

Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but not less than 1 unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but not less than 1 unit.
3. Smoke, Fire, and Flame Detectors: Quantity equal to 10 percent of amount of each type installed, but not less than 1 unit of each type.
4. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than 1 unit of each type.
5. Keys and Tools: One extra set for access to locked and tamperproofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in the system.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. FACP and Equipment:
   a. Fire Control Instruments, Inc.; a GE-Honeywell Company.
   b. Or approved equal
2. Wire and Cable:
   a. Belden, West Penn Wire/CDT; a division of Cable Design Technologies.
   b. Or approved equal.
3. Audible and Visual Signals:
   a. Wheelock Inc..
   b. Or approved equal

2.02 EXISTING FIRE ALARM SYSTEM

A. Compatibility with Existing Equipment: Fire alarm system and all components shall operate as an extension of an existing system.

B. Contractor is responsible to provide and install new equipment that will properly interface and operate with the existing Systems 3 FACP by Pyrotronics and meet all requirements of the agency having jurisdiction.

2.03 MANUAL FIRE ALARM BOXES

Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.

1. Single-action mechanism, breaking-glass or plastic-rod or pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.

2. Double-action mechanism requiring two actions to initiate an alarm, breaking-glass or plastic-rod or pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.

3. Station Reset: Key- or wrench-operated switch.

4. Indoor Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.

5. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm.

2.04 SYSTEM SMOKE DETECTORS

A. General Description:

1. UL 268 listed, operating at 24-V dc, nominal.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

3. Multipurpose type, containing the following:

   a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

   b. Piezoelectric sounder rated at 88 dBA at 10 feet (3 m) according to UL 464.

   c. Heat sensor, combination rate-of-rise and fixed temperature.

4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.

5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.

   a. Rate-of-rise temperature characteristic shall be selectable at the FACP for 15 or 20 deg F (8 or 11 deg C) per minute.

   b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at the FACP to operate at 135 or 155 deg F (57 or 68 deg C).

   c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.

2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

C. Duct Smoke Detectors:

1. Photoelectric Smoke Detectors:

a. Sensor: LED or infrared light source with matching silicon-cell receiver.

b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

2. UL 268A listed, operating at 24-V dc, nominal.

3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.

a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.

5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where indicated.

7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.

8. Each sensor shall have multiple levels of detection sensitivity.

9. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.

10. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.05 HEAT DETECTORS

A. General: UL 521 listed.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.

1. Mounting: Plug-in base, interchangeable with smoke-detector bases.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).

1. Mounting: Adapter plate for outlet box mounting or Plug-in base, interchangeable with smoke-detector bases.

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

D. Continuous Linear Heat-Detector System: Consists of detector cable and control unit.

1. Detector Cable: Rated detection temperature 155 deg F (68 deg C). Listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short circuit wires at the location of elevated temperature.

2. Control Unit: Two-zone or multizone unit as indicated. Provides same system power supply, supervision, and alarm features as specified for the central FACP.

3. Signals to the Central FACP: Any type of local system trouble is reported to the central FACP as a composite "trouble" signal. Alarms on each detection zone are individually reported to the central FACP as separately identified zones.

4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

2.06 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

2. Revise sound-level values in first four paragraphs below to comply with local interpretations of ADA requirements.

B. Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing the operating mechanism behind the bell. Bells shall produce a sound-pressure level of 94 dBA, measured 10 feet (3 m) from the bell. 10-inch (254-mm) size, unless otherwise indicated. Bells are weatherproof where indicated.

C. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.

D. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.

E. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 95 dBA, measured 10 feet (3 m) from the horn.

F. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output: candela as indicated on drawings.

2. Strobe Leads: Factory connected to screw terminals.

2.07 FIREFIGHTERS' TWO-WAY TELEPHONE COMMUNICATION SERVICE

N/A

2.08 REMOTE ANNUNCIATOR

A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Class 1, as applicable.

B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.09 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall and to a circuit-breaker shunt trip for power shutdown.

2.010 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Listed and labeled according to UL 632.

B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP, and automatically captures one or two telephone lines and dials a preset number for a remote central station. When contact is made with the central station(s), the signal is transmitted. The unit supervises up to two telephone lines. Where supervising 2 lines, if service on either line is interrupted for longer than 45 seconds, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. When telephone service is restored, unit automatically reports that event to the central station. If service is lost on both telephone lines, the local trouble signal is initiated.

C. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity is adequate to comply with NFPA 72 requirements.

D. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.011 GUARDS FOR PHYSICAL PROTECTION

Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

1. Factory fabricated and furnished by manufacturer of the device.

2. Finish: Paint of color to match the protected device.

2.012 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with CEC, Article 760.

B. Signaling Line Circuits: To be compatible with existing FACP. Twisted, shielded pair, No. 14 AWG or as indicated on drawings.

1. Circuit Integrity Cable: Twisted shielded pair, CEC Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.

2. Line-Voltage Circuits: No. 12 AWG, minimum.

3. Multiconductor Armored Cable: CEC Type MC, copper conductors, TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, UL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

PART 3 -- EXECUTION

3.01 EQUIPMENT INSTALLATION

A. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

1. Connect new equipment to the existing control panel in the existing part of the building.

2. Connect new equipment to the existing monitoring equipment at the Supervising Station.

3. Expand, modify, and supplement the existing control equipment as necessary to extend the existing control functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.

B. Smoke or Heat Detector Spacing:

C. Edit first subparagraph below to indicate how Contractor shall determine detector spacing.

1. Smooth ceiling spacing shall not exceed 30 feet (9 m) and the rating of the detector.

2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.

3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.

4. See Editing Instruction No. 13 in the Evaluations for discussion of placement of smoke detectors with respect to HVAC air inlets and outlets.

D. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.

E. Duct Smoke Detectors: Comply with NFPA 72,NFPA 90A and CMC. Install sampling tubes so they extend the full width of the duct.

F. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler

rating and location.

G. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.

H. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

I. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

J. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.

K. Device Location-Indicating Lights: Locate in public space near the device they monitor.

L. FACP: Surface mount with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

M. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

3.02 WIRING INSTALLATION

A. Install wiring according to the following:

1. NECA 1.
2. TIA/EIA 568-A.
3. CEC

B. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceway and Boxes for Electrical Systems."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour fire-rated fire alarm cables, CEC Types MI and CI, is not permitted.
3. Signaling Line Circuits: Power-limited fire alarm cables shall not be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type

terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum 1-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

H. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.03 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Identification for Electrical Systems."

B. Install instructions frame in a location visible from the FACP.

C. Paint power-supply disconnect switch red and label "FIRE ALARM."

3.04 GROUNDING

Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

3.05 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Testing Agency: Owner may engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

C. Testing Agency: The contractor shall engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:

D. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.

2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct

supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.

3. Include the existing system in tests and inspections.

4. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.

5. Testing: Follow procedure and record results complying with requirements in NFPA 72.

   a. Detectors that are outside their marked sensitivity range shall be replaced.

6. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in CEC.

3.06 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

C. Work in two paragraphs below is normally the responsibility of Owner. Retain one or both paragraphs if Owner needs additional time for inspections required by NFPA 72.

D. Semiannual Test and Inspection: Six months after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

E. Annual Test and Inspection: One year after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, semiannual, and annual periods. Use forms developed for initial tests and inspections.

3.07 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 01 Section "Demonstration and Training."

*****END OF SECTION*****