

CAROTHERS ROAD SOLID WASTE FACILITY
WHITMAN COUNTY, WASHINGTON

CONTRACT DOCUMENTS

for the construction of the
NEW WASTE TRANSFER BUILDING AND SITE IMPROVEMENTS

CONTRACT NO. XEW28

VOLUME I

PROCUREMENT REQUIREMENTS
CONTRACTING REQUIREMENTS
DIVISIONS 00 THRU 21

CH2M HILL

July 2013

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Project No. 437927

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PART 1

PROCUREMENT REQUIREMENTS

**ADVERTISEMENT FOR BIDS
CONTRACT NO. XEW28**

Owner: Whitman County Board of County Commissioners
400 North Main Street
Colfax, Washington 99111
Phone: 509/397-6200

Project: Carothers Road Solid Waste Facility
New Waste Transfer Building and Site Improvements

Engineer: CH2M HILL
322 East Front Street, Suite 200
Boise, Idaho 83702
Travis Pyle, P.E., (208) 383-6259
Travis.Pyle@ch2m.com

Sealed Bids for the Project will be received in paper copy form by the Board of County Commissioners of Whitman County, State of Washington, at its office in the Whitman County Courthouse in Colfax, Washington, until **11:00 a.m. Pacific Standard Time, on Monday, March 17, 2014**, at which time the all bids will be opened and publicly read. Any Bids received after the specified time will not be considered. Owner is not liable for delayed mail service or other delays that may cause the Bidder's bid package to not arrive on time. It is the Bidder's responsibility to ensure that their Bid is received on time and at the correct location.

Each bid shall be separately sealed in an envelope addressed to the Whitman County Board of County Commissioners with the name of the Bidder and the project name written plainly on the outside of the envelope. (NO FACSIMILIES WILL BE ACCEPTED)

Handicap access to the Whitman County Courthouse is available at the Mill Street Entrance.

The Project contemplated consists of constructing a new waste transfer building and site improvements at the Carothers Road Solid Waste Facility (located approximately 6 miles north of Pullman, one mile off of SR 195).

For information concerning the proposed Work, contact Mark Storey/Public Works Director and County Engineer at the Whitman County Department of Public Works (509.397-6206).

The Work shall be substantially complete on or before **January 16, 2015**, and completed in all respects no more than 30 calendar days after Substantial Completion is granted. Notice to Proceed will be granted on or before **May 15, 2014**.

Bidding Documents may be obtained at the Whitman County Department of Public Works, 310 North Main Street, Colfax, Washington 99111 (509.397-6210) upon payment in the amount of \$40.00 for each set. Only half-size drawings will be provided in the Bidding

Documents. Full-size drawings are not available for bidding nor are the Engineer's computer-aided engineering (CAE) design models. Return of the documents is not required, and amount paid for the Bidding Documents is nonrefundable. The detailed bid sheets and specifications are also available for download at www.whitmancounty.org.

To obtain Bidding Documents via mail, make arrangements with the Whitman County Department of Public Works for purchase and applicable shipping charges. Include check or money order in the amount noted above, plus the applicable shipping costs. Any cause of delay for the Contractor not receiving documents in time to bid the Project is not the responsibility of the Owner.

Each Bid must be submitted on the prescribed Bid Form and accompanied by Bid Security as prescribed in the Instructions to Bidders.

The Successful Bidder will be required to furnish the additional bond(s) and insurance prescribed in the Bidding Documents.

In order to submit a Bid on public work in the State of Washington, Bidders and their Subcontractors shall hold such licenses and registrations as required by Revised Code of Washington (RCW), and federal and local Laws and Regulations.

Bidders will be required to comply with State of Washington RCW 39.30.060 relating to identification of Subcontractors.

A **mandatory** prebid conference (site tour) will be held at **10:00 a.m. Pacific Standard Time, on Wednesday, March 5, 2014**, at the Carothers Road Solid Waste Facility. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Refer to Instructions to Bidders for additional information.

Each Bidder shall submit as part of their Bid, the names of all Subcontractors for the performance categories of Work designated on the list to be provided with the Bid or whose subcontract amount is more than 10 percent of the Contract Price with whom the Bidder, if awarded the Contract, will subcontract the Work. Bidder shall indicate by naming itself for any categories of Work that the Contractor will self-perform. Failure to name such Subcontractors or itself will render the Bidder's Bid nonresponsive, and therefore, void.

Owner's right is reserved to reject any and all Bids or any Bid not conforming to the intent and purpose of the Bidding Documents. No Bidder may withdraw their Bid within 60 days after the actual date of opening thereof.



Mark Storey, P.E.
Whitman County Public Works Director/
County Engineer

Published:

February 13, 2014

February 15, 2014

February 20, 2014

February 22, 2014

END OF SECTION

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

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

1.1.1. *Issuing Office*—The Owner's office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

1.1.2. *Apparent Low Bidder*—The Bidder whose Bid as offered in the Bid Form represents the lowest total as determined by the Base Bid (without sales and use taxes).

1.1.3. *Successful Bidder*—Lowest, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as provided herein) makes an award.

2. COPIES OF BIDDING DOCUMENTS

2.1. Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement for Bids may be obtained from the Issuing Office.

2.2. Complete sets of Bidding Documents shall be used in preparing Bids. Neither Owner nor Engineer assumes responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.

2.3. Drawings bound in the Bidding Documents are photographic reductions of original tracings. Amount of reduction is indicated by a note or scale bar on Drawing. Full-size Drawings are not available for the bidding of the Project nor are Engineer's computer-aided engineering (CAE) design models.

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

3. QUALIFICATIONS OF BIDDERS

3.1. In order to perform public work, Bidder and its Subcontractors, prior to award of Contract or as otherwise required by the jurisdiction, shall hold or obtain such licenses as required by State Statutes, and federal and local Laws and Regulations.

To demonstrate Bidder's qualifications to perform the Work, the Bidder shall provide with its Bid the Contractor's Qualification Form as provided in Section 00 43 16, Contractor's Qualification Form. In addition, the Bidder shall provide within 5 days of

Owner's request, written evidence such as financial data, previous experience, present commitments, references, and such other data as requested by the Owner.

3.2. Bidder is advised to carefully review those portions of the Bid Form requiring representations and certifications.

3.3. Per RCW 39.06.010, Bidders who have violated RCW 50.12.070, 51.16.070 or 82.32.070, concerning payroll records and tax records, within the last 2 years are prohibited from Bidding.

3.4. Other qualifications for contractor and its subcontractor(s) are provided in the applicable specification sections.

4. REGISTRATION REQUIREMENTS

4.1. All Bidders, including general contractors and specialty contractors, shall be registered as Contractors by the State Department of Licenses in conformance with the requirements of applicable parts of Chapter 18.27, RCW.

5. EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

5.1. Subsurface and Physical Conditions:

5.1.1. The Supplementary Conditions identify:

5.1.1.1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.

5.1.1.2. Those drawings known to Owner of physical conditions relating to existing surface and subsurface structures at the Site (except Underground Facilities).

5.1.2. Copies of reports and drawings referenced will be made available to the Bidder for viewing at the Issuing Office. 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. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings. Costs associated with making available copies of reports and drawings shall be borne by Bidder.

5.2. Underground Facilities: 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 Owner and Engineer by owners

of such Underground Facilities, including Owner or others. The Contractor is responsible for verifying any and all utilities, and repairing any utilities that are damaged by the Contractor.

5.3. Hazardous Environmental Condition:

5.3.1. The Supplementary Conditions identify reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

5.3.2. Copies of reports and drawings referenced will be made available by 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 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings. Costs associated with making available copies of reports and drawings shall be borne by Bidder.

5.4. 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 subsurface or physical conditions appear in Paragraphs 4.02 through 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.

5.5. On request and Owner’s approval of Bidder’s exploration plan, Owner will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall coordinate with the Owner for safety and ongoing facility operations, fill all holes, and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

5.6. Related Work at Site: Reference is made to the General Requirements for identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, 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.

5.7. Safety: Contractor shall exercise safety at all times and for all portions of the Work. Refer to Section 01 50 00, Temporary Facilities and Controls, for a general description of safety and protection requirements that the Contractor shall institute while performing the Work.

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

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

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

5.8.3. Become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

5.8.4. Carefully study all:

5.8.4.1. Reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable “technical data”.

5.8.4.2. Reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 4.06 of the Supplementary Conditions as containing reliable “technical data”.

5.8.5. Consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on:

5.8.5.1. Cost, progress, and performance of the Work.

5.8.5.2. 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.

5.8.5.3. Bidder’s safety precautions and programs.

5.8.6. 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 performance of the Work at the price(s) Bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

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

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

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

6. PREBID CONFERENCE

6.1. A **mandatory** prebid conference (site tour) will be held at **10:00 a.m. Pacific Standard Time, on Wednesday, March 5, 2014**, at the Carothers Road Solid Waste Facility (located approximately 6 miles north of Pullman, one mile off of SR 195). Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Bids will not be accepted from Bidders that do not have a company representative at the prebid conference. Owner and Engineer will transmit to prospective Bidders of record such Addenda as Owner and 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.

7. SITE AND OTHER AREAS

7.1. All areas for which the Work is shown are owned by Whitman County.

8. INTERPRETATIONS AND ADDENDA

8.1. All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner in writing. Interpretations or clarifications considered necessary by Owner and Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the office issuing documents as having received the Bidding Documents. Questions received less than 5 calendar 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.

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

9. BID SECURITY

9.1. Bid shall be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a penal Bid bond (on the attached form), issued by a surety meeting the requirements of Paragraph 5.01 and Paragraph 5.02 of the General Conditions.

9.2. 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 the time period specified in Article Signing of Agreement, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the 7th day after the Effective Date of the Agreement or the number of days specified for all Bids to remain subject to acceptance in Article Bids to Remain Subject to Acceptance, whereupon Bid security furnished by such Bidders will be returned.

9.3. Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within 7 days after Bid opening.

10. CONTRACT TIMES

10.1. 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.

11. LIQUIDATED DAMAGES

11.1. Provisions for liquidated damages, if any, are set forth in the Agreement.

12. SUBSTITUTE AND “OR-EQUAL” ITEMS

12.1. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

13. SUBCONTRACTORS, SUPPLIERS, AND OTHERS

13.1. Bidder shall submit with its Bid the identity of all Subcontractors, Suppliers, and other persons or entities proposed for those portions of the Work designated on the Bid Form, or which comprised 10 percent or more of the Contract Price. The Apparent Successful Bidder shall submit with 5 days after the opening of the Bids all additional information as requested by the Owner.

13.2. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute in which case apparent Successful Bidder shall submit an acceptable substitute. Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

13.3. If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest 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 Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in General Conditions Paragraph 6.06.B.

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

14. EMPLOYMENT REQUIREMENTS

14.1. Minority Businesses: In accordance with RCW 35.22.650, Bidder agrees that it shall actively solicit Bids for the subcontracting of goods or services from qualified minority businesses. Bidder shall furnish evidence of its compliance with these requirements of minority employment and solicitation. Bidder further agrees to consider the grant of subcontracts to minority bidders when substantially equal

proposals are received. Bidder shall submit evidence of compliance with this requirement as part of Bid.

14.2. Apprentices: In accordance with RCW 39.04.320, no less than 15 percent of labor hours shall be performed by apprentices.

15. WAGE RATES

15.1. The Work under these Bidding Documents is to be paid for by public funds; therefore, minimum prevailing wage rates for Whitman County as published by Washington State Department of Labor and Industries are applicable. The Awarded Bidder needs to provide a Statement of Prevailing Wage on Public Works Contract, and Affidavit of Wages Paid. Refer to Paragraph 6.09.D of the Supplementary Conditions for more information.

16. PREPARATION OF BID

16.1. With each copy of the Bidding Documents, Bidder will be furnished one separate unbound copy of the Bid Form, and, if applicable, the Bid Bond Form. No substitution of the Bid Form will be allowed.

16.2. All blanks on the Bid Form shall be completed by typing or printing with ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each Bid item.

16.3. 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 corporate address and state of incorporation shall be shown.

16.4. 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 official address of the partnership shall be shown.

16.5. 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 official address of the firm shall be shown.

16.6. A Bid by an individual shall show the Bidder's name and official address.

16.7. A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.

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

16.9. The Bid shall contain an acknowledgement of receipt of all Addenda; the numbers of which shall be filled in on the Bid Form.

16.10. Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

16.11. The Bid shall contain evidence of Bidder's authority and qualification to do business in the State of Washington, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number and class, if applicable, shall also be shown on the Bid Form.

17. BASIS OF BID; COMPARISON OF BIDS

17.1. The Base Bid is the total of the Lump Sum (LS) bid items and the Unit Price (UP) bid items as stated on the Bid Form (before sales and use tax). The bid items shall include all overhead and profit, B&O taxes, and all other applicable costs for performing and administering the work.

17.2. Lump Sum:

17.2.1. Bidders shall submit a Bid for each lump sum item of Work listed in the Bid schedule.

17.3. Unit Price:

17.3.1. Bidders shall submit a Bid for each Unit Price (UP) item of Work listed in the Bid schedule.

17.3.2. The total of all estimated 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.

17.3.3. Discrepancies between the multiplication of units of Work and unit prices will be resolved in 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.

18. SUBMISSION OF BID

18.1. Bidders shall complete and provide the following with its Bid:

18.1.1. Bid Form.

18.1.2. Bid Security.

18.1.3. Contractor's Qualification Form.

- 18.1.4. Certificate of Insurance.
- 18.1.5. Affidavit of Individual, Copartnership, or Corporation.
- 18.1.6. Evidence of Signature Authority to Bind Company.
- 18.1.7. Agreement to Affirmative Action.
- 18.1.8. Noncollusion Affidavit.
- 18.1.9. Agreement to Affirmative Action.
- 18.1.10. Acknowledgement of Receipt of Addenda (on the Bid Form).
- 18.1.11. Bidder's Subcontractor's List (on the Bid Form).
- 18.1.12. Evidence of authority to do business in the state of the Project (Contractor's License No.); or a written covenant to obtain such license within the time for acceptance of Bids.

19. MODIFICATION AND WITHDRAWAL OF BID

19.1. A Bid may be modified or withdrawn by an appropriate document duly executed in the same 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.

20. OPENING OF BIDS

20.1. Bids will be opened at the time and place indicated in the Advertisement for Bids and unless obviously nonresponsive, read aloud publicly. An abstract of the amounts of the Base Bids and major alternates, if any, will be made available to Bidders within 7 calendar days after the opening of Bids.

21. BIDS TO REMAIN SUBJECT TO ACCEPTANCE

21.1. All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

22. EVALUATION OF BIDS AND AWARD OF CONTRACT

22.1. Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. 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.

22.2. 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 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.

22.3. In evaluating Bids, 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.

22.4. In evaluating Bidders, Owner will consider the qualifications of Bidders and the qualifications and experience of its 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 with the Bid.

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

22.6. If the Contract is to be awarded, Owner will award the Contract to Bidder whose Bid is in the best interests of the Project.

23. CONTRACT SECURITY AND INSURANCE

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

24. SIGNING OF AGREEMENT

24.1. When Owner issues a Notice of Award to Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents that are identified in the Agreement as attached thereto. Within 15 calendar days thereafter, the Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 20 calendar days thereafter, Owner will deliver one fully signed counterpart to Successful Bidder.

25. SALES AND USE TAXES

25.1. Applicable sales and use taxes shall not be included in the Bid. Refer to Paragraph 6.10 of the Supplementary Conditions for additional information.

26. RETAINAGE

26.1. Provisions concerning retainage and Contractor's rights to deposit securities in lieu of retainage, if applicable, are set forth in the Agreement.

END OF SECTION

NOTE TO BIDDER: Use typed print or ink (legibly written) for completing this Bid Form.

BID FORM

1. BID RECIPIENT

1.1. This Bid is submitted to:

To: Whitman County Board of County Commissioners

Project Identification: Carothers Road Solid Waste Facility – New Waste Transfer Building and Site Improvements

Contract No.: XEW28

1.2. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with 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 this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2. BIDDER'S ACKNOWLEDGEMENTS

2.1. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

2.2. Bidder agrees that the Bid amount(s) stated herein includes specific consideration for specified insurance coverages (as specified in the Supplementary Conditions) and also includes all B&O taxes.

3. BIDDER'S REPRESENTATIONS

3.1. In submitting this Bid, Bidder represents that:

3.1.1. 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.

<u>Addendum No.</u>	<u>Addendum Date</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

(Bidder shall insert number of each Addendum received.)

3.1.2. 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.

3.1.3. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

3.1.4. Bidder has carefully studied: i) reports of explorations and tests of subsurface conditions at or contiguous to the Site and drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) which have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data,"; and ii) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data."

3.1.5. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

3.1.6. Based on information and observations referred to in paragraph above, Bidder does not consider that 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 required, and in accordance with the other terms and conditions of the Bidding Documents.

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

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

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

4. BIDDER'S CERTIFICATION

4.1. Bidder certifies:

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

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

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

4.1.4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this paragraph:

4.1.4.1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

4.1.4.2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish Bid prices at artificial noncompetitive levels, or (c) to deprive Owner of the benefits of free and open competition;

4.1.4.3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, noncompetitive levels; and

4.1.4.4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

4.1.5. The sales and use tax is separately itemize for this Project. The amount of such tax is not a competitive Bid item and will not be used in determining the lowest priced Bid as it is considered an estimate for what taxes the Contractor will be obligated to pay.

5. NAMING OF SUBCONTRACTORS

5.1. Bidder agrees to submit as part of its Bid the names of the Subcontractors with whom Bidder, if awarded the Contract, will subcontract work to for those categories listed, or for those that will perform 10 percent or more of the Contract Price. If Contractor plans to self-perform the work, Contractor shall list themselves in the list. Bidder acknowledges that failure to name such Subcontractors or itself shall render the Bidder's Bid nonresponsive, and therefore, void. Refer to the applicable specification sections for minimum experience (qualifications), where required.

Bidder's List of Subcontractors				
Category of Work	Subcontractor's Name	Subcontractor's Address	WA State Contractor's Registration No.	Subcontract Amount
Site Civil/Earthwork				
Pre-Engineered Metal Building Manufacturer				
Building Erector				
Electrical				
Mechanical – Plumbing				
Mechanical - HVAC				
Surveyor				
Concrete				
<u>Others:</u>				

6. BASIS OF BIDS

6.1. Bidder shall complete the Work in accordance with the Contract Documents for the following price(s):

6.2. LUMP SUM BID SCHEDULE

6.2.1. Lump Sum (LS) Work: Bidder agrees to accept as full payment for the Lump Sum Work items proposed within the Bidding Documents based upon the undersigned's own estimate of quantities and costs and including all overhead and profit and B&O taxes.

6.2.2. Lump Sum (LS) Bid Schedule:

Lump Sum (LS) Bid Schedule			
Item ID*	Description	Unit	Bid Price
LS-1	General Conditions	LS	\$
LS-2	Temporary Facilities & Temporary Erosion and Sediment Controls	LS	\$
Total of Lump Sum Items			\$
*See Section 01 11 00, Summary of Work, for description of Bid items, and Section 01 29 00, Payment Procedures, for how the items are measured and paid.			

6.3. UNIT PRICE BID SCHEDULE

6.3.1. Unit prices have been computed in accordance with Paragraph 11.03.C of the General Conditions.

6.3.2. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

6.3.3. Unit Price (UP) Bid Schedule:

Unit Price (UP) Bid Schedule					
Item ID*	Description	Estimated Quantity	Unit	Bid Unit Price	Extended Bid Unit Price
UP-1	Site Preparation	1	US	\$	\$
UP-2	General Site/Yard Work	1	US	\$	\$
UP-3	General Site Excavation	15,600	CY	\$	\$
UP-4	General Site Fill	5,000	CY	\$	\$

Unit Price (UP) Bid Schedule					
Item ID*	Description	Estimated Quantity	Unit	Bid Unit Price	Extended Bid Unit Price
UP-5	Gravel Access Roads/Pads	11,700	SY	\$	\$
UP-6	ACP Access Roads/Pads	5,300	SY	\$	\$
UP-7	Gravity Block Wall	2,600	SF	\$	\$
UP-8	Domestic Waterline	190	LF	\$	\$
UP-9	Contact Water Gravity Lines	240	LF	\$	\$
UP-10	Contact Water Pressure Line	320	LF	\$	\$
UP-11	Contact Water Lift Station	1	US	\$	\$
UP-12	Sanitary Sewer Gravity Line	240	LF	\$	\$
UP-13	Sanitary Sewer Pressure Line	240	LF	\$	\$
UP-14	Site/Yard Electrical and Lighting	1	US	\$	\$
UP-15	Commercial Truck Scale	1	US	\$	\$
UP-16	WTB - General Excavation	6,000	CY	\$	\$
UP-17	WTB - General Fill	1,200	CY	\$	\$
UP-18	WTB - Structural Fill	500	CY	\$	\$
UP-19	WTB - Architectural and Structural	1	US	\$	\$
UP-20	WTB - Mechanical	1	US	\$	\$
UP-21	WTB - Electrical and Lighting	1	US	\$	\$
UP-22	Installation of Owner-furnished Knuckleboom Crane	1	US	\$	\$
UP-23	WTB - Axle-Pit Scales	1	US	\$	\$
UP-24	Z-Wall - Architectural and Structural	1	US	\$	\$
Total of Extended Bid Unit Prices					\$
*See Section 01 11 00, Summary of Work, for description of Bid items, and Section 01 29 00, Payment Procedures, for how the items are measured and paid.					

6.4. BASE BID SUMMARY

TOTAL OF LUMP SUM BID ITEMS \$ _____

TOTAL OF EXTENDED UNIT PRICE BID ITEMS \$ _____

BASE BID* \$ _____

SALES AND USE TAX (ESTIMATE) \$ _____

TOTAL PROJECT COST (ESTIMATE) \$ _____

*Basis for Contractor Selection

Bidder acknowledges that unit prices have been computed in accordance with Paragraph 11.03 of the General Conditions. Bidder further acknowledges that quantities are not guaranteed and final payment will be based on actual quantities as determined in the Contract Documents.

7. TIME OF COMPLETION

7.1. Bidder agrees the Work will be substantially complete on or before January 15, 2015, and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions no more than 30 days after Substantial Completion is granted. Notice to proceed will be granted on or before May 14, 2014.

7.2. Bidder further accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Times.

8. ATTACHMENTS TO THIS BID

8.1. Refer to Section 00 21 13, Instruction to Bidders, for a list of attachments (enclosures) that must accompany the Bid.

9. SURETY

9.1. If Bidder is awarded the construction contract for this Bid, the surety company who will provide the Performance and Payment Bond(s) will be:

_____ whose address is

Street City State Zip

10. BID SUBMITTAL

10.1. This Bid submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By (signature): _____

Doing business as: _____

A Partnership

Partnership Name: _____ (SEAL)

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

Name (*typed or printed*): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

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

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

Name (*typed or printed*): _____

Title: _____ (CORPORATE SEAL)

Attest: _____
(*Signature of Corporate Secretary*)

Date of Qualification to do business in Washington State is:
_____.

A Joint Venture

Joint Venturer Name: _____ (SEAL)

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 a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address: _____

Phone No.: _____ FAX No.: _____

E-mail: _____

SUBMITTED on _____, 20_____

Washington State Contractor's License No.: _____

Contractor's License Class (where applicable): _____

END OF SECTION

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):

BID

Bid Due Date:

Project (Brief Description Including Location):

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)
Bidder's Name and Corporate Seal

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

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

Attest: _____
Signature and Title

Attest: _____
Signature and Title

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

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the

face of this Bond. Payment of the penal sum is the extent of Surety's liability.

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

3. This obligation shall be null and void if:

3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2. All Bids are rejected by Owner, or

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

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and 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. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after 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 in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and 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. 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 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.

END OF SECTION

CONTRACTOR'S QUALIFICATION FORM

The Owner requires a statement as to financial ability, equipment, and experience to be completed and submitted by Prospective Contractors bidding on this Project. This form shall be submitted as part of the Bid in accordance with the Advertisement for Bids and Instructions to Bidders.

Submitted to: Whitman County Board of County Commissioners

By: _____ A Corporation
(Contractor) _____ A Partnership
_____ An Individual

Type of Work: _____

Principal Office: _____

Contractor's Surety: _____

Contractor's Bank and Local Contact: _____

EXPERIENCE QUESTIONNAIRE

1. How many years has your organization been in business as a contractor under your present business name? _____
2. How many years' experience in the proposed type and size of construction work has your organization had as general contractor: _____
3. List the most recent projects your organization has had in construction work similar in type and size to the work proposed herein:

Contract Amount	Class of Work	When Completed	Name & Address of Owner/Reference Contact

4. What other important projects has your organization completed?

Contract Amount	Class of Work	When Completed	Name & Address of Owner/Reference Contact

5. Have you ever failed to complete any work awarded to you? _____. If so, where and why? _____

6. Name the Surety Company, and the name and address of the local agent you expect to use in the event this contract is awarded to you:

7. What is the construction experience of the individuals that will be involved in this Project:

Individual's Name	Present Position or Office	Years of Construction Experience	Magnitude and Type of Work	In What Capacity

8. List the major items of equipment which you own or which will be available for use on the proposed Project:

9. List below the contracts which you, or your company, or corporation were party, during the previous 10 years which contracts were involved in litigation of any type:

10. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by Owner? ____Yes ____No

The undersigned hereby declares that the foregoing statements are true.

By_____

Title_____

Date_____

END OF SECTION

STATE OF _____ }
 _____ } ss.
 COUNTY OF _____ }

(Applicant must also sign here)

My commission expires: _____

Notary Public

PW/WBG/437927
JULY 2013
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CONTRACTOR'S AFFIDAVIT
AFFIDAVIT FOR INDIVIDUAL
00 43 17 - 1

STATE OF _____ }
COUNTY OF _____ } ss.

taken from the books of said firm, is a true and accurate statement of the financial condition of said firm as of the date thereof, and that the answers to the interrogatories contained therein are true; that the statements and answers to the interrogatories of the equipment questionnaire are correct and true as of the date of this affidavit; and that the statements and answers to the interrogatories of the foregoing experience questionnaire are correct and true as of the date of this affidavit.

Notary Public

PW/WBG/437927
JULY 2013
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STATE OF _____ }
 _____ } ss.
 COUNTY OF _____ }

being duly sworn, depose and say that I am _____,

of the _____,
the corporation described herein and which executed the foregoing statement; that I am familiar with the books of the said corporation showing its financial condition; that the foregoing financial statement, taken from the books of said corporation, is a true and accurate statement of the financial condition of said corporation as of the date thereof, and that the answers to the interrogatories of the equipment questionnaire are correct and true as of the date of this affidavit; and that the statements and answers to the interrogatories of the foregoing experience questionnaire are correct and true as of the date of this affidavit.

Subscribed and sworn to before me this _____ day of _____, 20____.

My commission expires: _____

Notary Public

END OF SECTION

NONCOLLUSION AFFIDAVIT

STATE OF _____ }
COUNTY OF _____ } ss.

_____, being first duly sworn, deposes
and says that he is _____
(sole owner, a partner, president, secretary, etc.)

of the party making the foregoing bid; that such bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; that said Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, nor that anyone shall refrain from bidding; that said Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of said Bidder or any other Bidder, nor to fix any overhead, profit, or cost element of such bid price, nor of that of any other Bidder, nor to secure any advantage against the public body awarding the Contract or anyone interested in the proposed Contract; that all statements contained in such bid are true; and, further, that said Bidder has not directly or indirectly, submitted his bid price or any breakdown thereof, nor the contents thereof, nor divulged therewith to any corporation, partnership, company, association, organization, bid depository, nor to any member or agent thereof, nor to any other individual except to such person or persons as have a partnership or other financial interest with said Bidder in his general business.

Signed: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20____

My commission expires: _____

Notary Public

END OF SECTION

PART 2

CONTRACTING REQUIREMENTS

AGREEMENT FORM

THIS AGREEMENT is by and between _____

(Owner) and _____

(Contractor).

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

1. WORK

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

1.1.1. Construction of a new solid waste transfer station and site improvements at the Whitman County Carothers Road Solid Waste Facility.

2. ENGINEER

2.1. The Project has been designed by CH2M HILL (Engineer), who is to act as Owner's representative, assume duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

3. CONTRACT TIMES

3.1. Time of the Essence: Time limits for Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

3.2. Dates for Substantial Completion and Final Payment:

3.2.1. The Work shall be substantially completed on or before **January 16, 2015**, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions no later than 30 days after Substantial Completion is granted. Notice to Proceed will be granted on or before **May 15, 2014**.

3.3. Liquidated Damages:

3.3.1. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph Contract Times 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 proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner \$3,100 for each day that expires after the time specified herein for Substantial Completion until the Work is substantially complete.

3.3.2. After Substantial Completion, if Contractor neglects, refuses, or fails to complete remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$2,000 for each day that expires after the time specified herein for completion and readiness for final payment until the Work is completed and ready for final payment.

3.3.3. Owner shall recover such liquidated damages by deducting the amount owed from the final payment or any retainage held by the Owner.

4. CONTRACT PRICE

4.1. Owner will 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 the following:

4.1.1. For Lump Sum Work:

_____ Dollars
(Words)
and _____ Cents \$ _____
(Words) (Figures)

Plus:

4.1.2. For Unit Price Work:

_____ Dollars
(Words)
and _____ Cents \$ _____
(Words) (Figures)

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.

Plus:

4.1.3. For estimated Sales and Use Taxes:

_____ Dollars
(Words)
and _____ Cents \$ _____
(Words) (Figures)

4.1.4. Total Contract Price:

_____ Dollars
(Words)
and _____ Cents \$ _____
(Words) (Figures)

5. PAYMENT PROCEDURES

5.1. Submittal and Processing of Payments: Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

5.2. Progress Payments and Retainage: Owner will make progress payments on account of the Contract Price on the basis of Contractor's Application for Payment on the date of each month as established in the preconstruction conference during performance of the Work as provided herein. All such payments will be measured by the Schedule of Values established as provided in Paragraph 2.07 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) and as specified in Section 01 29 00, Payment Procedures.

5.2.1. 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 Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:

5.2.1.1. Ninety percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, Owner, on recommendation of

Engineer, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no additional retainage; and

5.2.1.2. Ninety percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

5.2.2. Upon Substantial Completion, Owner will pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer will determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 100 percent of Engineer's estimate of the value of Work, at Owner's discretion, to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

5.3. Final Payment:

5.3.1. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner will pay the remainder of the Contract Price as recommended by Engineer as provided in Paragraph 14.07 (including retainage).

6. CONTRACTOR'S REPRESENTATIONS

6.1. In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

6.1.1. Contractor has examined and carefully studied the Contract Documents.

6.1.2. 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.

6.1.3. Contractor 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.

6.1.4. Contractor has carefully studied: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) if any, which have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data", and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site which have been identified in Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data."

6.1.5. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on 1) the cost, progress, and performance of the Work; 2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and 3) Contractor's safety precautions and programs.

6.1.6. Based on the information and observations referred to above, 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.

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

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

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

7. CONTRACT DOCUMENTS

7.1. Contents:

7.1.1. The Contract Documents that are attached to this Agreement (except as expressly noted otherwise) consist of the following:

7.1.1.1. This Agreement.

7.1.1.2. Performance Bond.

7.1.1.3. Payment Bond.

7.1.1.4. General Conditions.

7.1.1.5. Supplementary Conditions.

7.1.1.6. Specifications as listed in the table of contents and all attachments.

7.1.1.7. Drawings with each sheet bearing the following general title: "Carothers Road Solid Waste Facility, New Waste Transfer Building and Site Improvements, Whitman County, WA."

7.1.1.8. Addenda.

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

7.1.2.1. Contractor's Bid Package.

7.1.2.2. Documentation submitted by Contractor prior to Notice of Award.

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

7.1.3.1. Notice to Proceed.

7.1.3.2. Work Change Directives.

7.1.3.3. Change Order(s).

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

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

8. MISCELLANEOUS

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

8.2. Successors and Assigns: Owner and 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.

8.3. Severability: Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree 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.

8.4. Assignment of Contract:

8.4.1. No assignment by a party hereto of any rights under or interests in the Contract shall be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, monies that may become due and monies 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 shall release or discharge the assignor from any duty or responsibility under the Contract Documents.

8.5. Contractor's Certifications:

8.5.1. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this paragraph:

8.5.1.1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in Contract execution;

8.5.1.2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract Price at artificial noncompetitive levels, or (c) to deprive Owner of the benefits of free and open competition;

8.5.1.3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, noncompetitive levels; and

8.5.1.4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.6. Prevailing Wages:

8.6.1. The Awarded Bidder needs to provide a Statement of Prevailing Wage on Public Works Contract, and Affidavit of Wages Paid. Refer to Paragraph 6.09.D of the Supplementary Conditions for more information.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in triplicate. One counterpart each has been delivered to Owner, Contractor, and Engineer. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____, 20__ (which is the Effective Date of the Agreement).

OWNER: Whitman County Washington

By: _____

Title: Chairman, Board of Commissioners

Date: _____

Approved as to form:

CONTRACTOR: _____

By: _____

Title: _____

Date: _____

Attest: _____

Contractor's License No. _____

Agent for service or process: _____

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

END OF SECTION

PERFORMANCE BOND FORM

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):

CONTRACT

Date:
Amount:
Description (Name and Location):

BOND

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

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side 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

SURETY

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)

SURETY

(Seal)

Name and Title

Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

Attest: _____
Signature and Title

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

2. If Contractor performs the Contract, Surety and 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, Surety's obligation under this Bond shall arise after:

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

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

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

1. Surety in accordance with the terms of the Contract;
2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

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

- 4.1. Arrange for Contractor, with consent of 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 Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with 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 Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from 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 Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or

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

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

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

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

6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of 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 Contractor.

7. Surety shall not be liable to Owner or others for obligations of 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 Owner or its heirs, executors, administrators, or successors.

8. Surety hereby waives notice of any change, including changes of time, to 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 years after Contractor Default or within two years after Contractor ceased working or within two years after 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 Surety, Owner, or 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 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.

12. Definitions.

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

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

12.3. Contractor Default: Failure of 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 Owner, which has neither been remedied nor waived, to pay 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 (engineer or other party)

END OF SECTION

PAYMENT BOND FORM

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):

CONTRACT

Date:
Amount:
Description (Name and Location):

BOND

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

Surety and 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

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

SURETY

Company:

Signature: _____(Seal)
Name and Title

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

Attest: _____
Signature and Title

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to 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 Owner, this obligation shall be null and void if Contractor:

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

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

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

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

4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to 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 Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 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 Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and

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

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

6. Reserved.

7. 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 Surety.

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

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. 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. 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 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 Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or 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, 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 Contractor, or with a first-tier subcontractor of 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 Contractor and 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 Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay 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 (engineer or other party):

END OF SECTION

NOTICE OF AWARD

TO: _____

Project Description: Whitman County Carothers Road Solid Waste Facility – New Waste Transfer Building and Site Improvements.

Owner has considered the Bid submitted by you for the above-described work in response to its Advertisement for Bids dated _____, 20__.

You are hereby notified that your Bid has been accepted for items in the amount of _____ \$_____. You are required to execute said Contract and to furnish the required bond within 20 calendar days from the date of this Notice. If you fail to execute said bond within that time period, said Owner will be entitled to consider all your rights arising out of Owner's acceptance of your Bid as abandoned, and as a forfeiture of your bid bond, and Owner will be entitled to such other rights as may be granted by law.

You are requested to return an acknowledged copy of this Notice of Award to Owner.

Dated this _____ day of _____, 20__.

Whitman County Board of County Commissioners
Owner

By _____

Title Chairman, Board of Commissioners

ACCEPTANCE OF AWARD

Receipt of the above Notice of Award is hereby acknowledged.

By _____
(Contractor)

this, the _____ day of _____, 20____

By _____
(Signature)

By _____
(Type Name of Signatory)

Title _____

END OF SECTION

NOTICE TO PROCEED

TO: _____

Date: _____

Project: Whitman County – Carothers
Road Solid Waste Facility, New Waste
Transfer Building and Site Improvements
(Contract No. XEW28)

You are hereby notified to commence Work in accordance with the Agreement dated
_____, 20__, on or before _____, 20__, and you are to
substantially complete the work on or before **January 16, 2015**, with final completion no
later than 30 days after Substantial Completion is granted.

Owner: _____

By: _____

Title: _____

Date: _____

Approved as to Form:

ACCEPTANCE OF NOTICE TO PROCEED

Receipt of the above Notice to Proceed is hereby acknowledged by _____.

Contractor: _____

By: _____

Title: _____

Date: _____

END OF SECTION

LIEN RELEASE FORM

TO:

STATE OF _____)
)ss.
COUNTY OF _____)

The Undersigned, being first duly sworn, deposes and says: That he is the party to that certain contract dated _____, 20____, covering the construction of:

That he has performed the work thereunder and completed the same, that all just debts due all laborers, mechanics, material men, and all persons who supplied him with materials or goods of any kind for this work, and that all premiums earned on Workman's Compensation Insurance for labor performed on the above-stated work, have been duly and fully paid or reimbursed.

Contractor

By _____
Authorized Representative

SUBSCRIBED AND SWORN to before me this _____ day of _____, 20__.

Notary Public, Residing at

My Commission expires

APPROVED BY:

Surety

END OF SECTION

REQUEST TO SUBLET WORK

Sub _____
Agent _____

Prime Contractor

Federal Empl. ID No.

St. Cont. No

Address

Federal-Aid Project No.

City

State

Zip

Sign Route

Request No.

Approval is Required to Sublet the Following Described Work To:

Subcontractor or Agent

Federal Employer ID No.*

Address

Telephone No.

City

State

Zip

Estimated Starting Date

*If no federal employer ID No., use Owner's Social Security No.

Work To Be Sublet

Item No.	Partial	Item Description	Amount

I understand and will ensure that the subcontractor will comply fully with the Plans and Specifications under which this work is being performed.

Prime Contractor Signature

Date

Approved County Engineer

Date

END OF SECTION

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

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AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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

3. *Application for Payment*—The form acceptable to Engineer which is to be used by 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.

4. *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.

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

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *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.

9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner 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.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of 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.

11. *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.

12. *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 submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to 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).

14. *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 Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

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

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but 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.

19. *Engineer*—The individual or entity named as such in the Agreement.

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

21. *General Requirements*—Sections of Division 1 of the Specifications.

22. *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.

23. *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.

24. *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.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

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

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

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

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

30. *PCBs*—Polychlorinated biphenyls.

31. *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.

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

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

34. *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.

35. *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.

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

37. *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.

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

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

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

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

42. *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.

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

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of 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.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

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

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

48. *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.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *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.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by 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 words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated 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 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 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 information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or 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 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 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 Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by 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 Contractor, “provide” is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases that 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 Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, 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 reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. 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. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

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

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

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 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; Designation of Authorized Representatives

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, 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 records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 Initial Acceptance of Schedules

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

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the

Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

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

3. Contractor's Schedule of Values will be acceptable to 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 reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by 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 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 Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from 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, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge 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, or code, or the instruction of any Supplier (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. 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 Engineer or its consultants, including electronic media editions; or
2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

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

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to 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 user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies 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 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day 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; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If 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 Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and 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. 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:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the 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 officers, directors, members, partners, employees, agents, consultants, or subcontractors 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.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which 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 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 Owner and Engineer in writing about such condition. 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, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of 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 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. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to 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 Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

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

3. If 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 therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to 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 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 on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

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

2. the cost of all of the following will be included in the Contract Price, and 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 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, 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 Owner and Engineer. 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, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If 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 Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. 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 Owner. Contractor shall report to 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:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the 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 officers, directors, members, partners, employees, agents, consultants, or subcontractors 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. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous

Environmental Condition, 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 Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (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 Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

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

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, 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 Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate 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, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate 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. 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 Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one 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. 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 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 or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall

show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by 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 requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 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 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 coverages 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. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

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

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's

liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by 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 Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than 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 therefrom; 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:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of

whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages 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 contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to 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);

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

6. include completed operations coverage:

a. Such insurance shall remain in effect for two years after final payment.

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

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, 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 a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, 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 that 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 Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

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

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the

interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, 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 a loss payee.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this 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 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of 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 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.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, 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 insureds or loss payees thereunder. Owner and Contractor waive all

rights against each other and their respective officers, directors, members, 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 Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages 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 Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, 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 Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by 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 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 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 Contractor, Subcontractors, or Engineer, and the officers, directors, members, 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 Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner 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, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner 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 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner 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, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

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

A. If either 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 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. 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.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If 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. 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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of 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, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. 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. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, 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 Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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. 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. Contractor shall submit to 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 Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by 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 Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in 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 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; and

3) it has a proven record of performance and availability of responsive service.

b. 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:*

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

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

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as

supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

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

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

b) whether 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 Owner for other work on the Project) to adapt the design to the proposed substitute item, and

c) whether 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:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) 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, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in 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 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 a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

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

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

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in

Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. 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 Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, 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. 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 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 Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to 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 Contractor is responsible for 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 Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

2. shall create any obligation on the part of 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. 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 Contractor.

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

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control 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 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 Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee 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 Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, 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, Contractor will obtain the same.

6.07 Patent Fees and Royalties

A. 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 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 Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors 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 specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. 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. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. 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 Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, 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 other dispute resolution costs) arising out of or relating to such Work.

However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of 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 Contract Price or Contract Times. If 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 therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by 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. 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. 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, 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, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 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 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 Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work 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: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. 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 Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. 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. 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. 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. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. 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 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 Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of 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 Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. 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 Engineer has issued a notice to 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. 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.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with 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, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if 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 Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as 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 Engineer the services, materials, and equipment Contractor proposes to provide and to enable 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 intended and other data as Engineer may require to enable 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 Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

- a. 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;
- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
- c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
- d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

3. With each submittal, Contractor shall give Engineer specific written notice of any variations 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 Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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. Engineer's review and approval will not extend to 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. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. 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. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 Continuing the Work

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or

disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 Contractor's General Warranty and Guarantee

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

C. 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 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 Engineer or any payment related thereto by Owner;

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

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

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

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 therefrom but only to the extent caused by any negligent act or omission of 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 Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of 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, 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 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 Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, 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; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. 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 Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. 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 Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. 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 Engineer.

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

D. Pursuant to this Paragraph 6.21, 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. 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. 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. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, 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 Contractor prior to starting any such other work; and

2. if 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 therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and 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. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

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

7.02 *Coordination*

A. If 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 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, 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 Owner.

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

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

A. Owner shall make payments to 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. Owner's duties with respect to 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 Owner's identifying and making available to Contractor copies of reports of

explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor 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 Contractor to comply with Laws and Regulations applicable to the performance of the Work. 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. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer 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 Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for 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, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, 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 Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such 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. 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 Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or 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 therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that 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. 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 Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

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

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

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by

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

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and 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 Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of 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. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or 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 Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by 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 Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any

Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. 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 Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

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

D. 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, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

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, Owner may, 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, 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 Owner and 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 therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. 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.D.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by 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 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 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, 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 the provisions of any bond require notice to be given to a surety 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), the giving of any such notice will be Contractor's responsibility. The amount of each applicable

bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or 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 Engineer and the other party to the Contract promptly (but in no event later than 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 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by 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 Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action:* Engineer will review each Claim and, within 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 Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 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 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 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 Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. 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 Owner.

2. 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 Contractor unless Owner deposits

funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of 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 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 Contractor's employees incurred in discharge of duties connected with the Work.

b. 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 Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by 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 Contractor is liable, as imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of 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.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by 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 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 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, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance 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 Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in

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

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

4. Costs due to the negligence of 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.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, 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, 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, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to 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.

B. *Cash Allowances:*

1. Contractor agrees that:

a. the cash allowances include the cost to 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. 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. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due 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 comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by 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 Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

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

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly 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. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

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 Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent 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 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 Contractor to 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 Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in 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.

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 Engineer 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 Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by 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 Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If 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 Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to 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 Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of 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 Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give 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. 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 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,

Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and 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 Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

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

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and 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 Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as 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, 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 Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor 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, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or 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, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of 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 written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. 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, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one 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 Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall

promptly, without cost to Owner and in accordance with 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 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 therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, 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 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 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 therefrom) 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 year after such correction or removal and replacement has been satisfactorily completed.

E. 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 Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. 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) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer'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 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, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of 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 Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable 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 Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract

Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor 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 Contractor's defective Work.

D. 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 Owner of 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 Engineer. 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 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by 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 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 Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on

account to discharge 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. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

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, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer 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 Engineer in the Contract Documents; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

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 Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes 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 Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer 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 Engineer's opinion to protect 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. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten 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.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. 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 Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that 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 and subject to interest as provided in the Agreement.

14.03 Contractor's Warranty of Title

A. 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 Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to 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. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and 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 Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer 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.

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 Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all

particulars in which this inspection reveals that the Work is incomplete or defective. 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 Contractor has, in the opinion of Engineer, 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 or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, 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.6;
- b. consent of the surety, if any, to final payment;
- c. a list of all Claims against Owner that Contractor believes are unsettled; and
- d. complete and legally effective releases or waivers (satisfactory to 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 Owner, 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 Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the 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.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, 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 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 Contractor to Engineer 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.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against 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 Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by 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, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. 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 Contractor makes a Claim therefor 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. 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);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. 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 Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, 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 Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven 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 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that 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 days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, 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;

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. 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 Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from 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 Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay

Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude 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 Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to 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 and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 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, 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 30 days after termination of the mediation unless, within that time period, Owner or 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 the intent to submit the Claim to a court of competent jurisdiction.

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 Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix “SC” added thereto.

SC-1.01. Renumber Paragraph 1.01.A.42 to 1.01.A.42.a, and add the following new paragraph:

1.01.A.42.b. *Standard Specifications*—Wherever in these Contract Documents reference is made to the Standard Specifications, said reference shall be understood as referring to the Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT, 2012) and all applicable updates and amendments which applicable parts are incorporated herein and made a part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications are modified by or are in conflict with supplemental information in these Contract Documents, the requirements of these Contract Documents shall prevail.

SC-1.01. Add the following language at the end of Paragraph 1.01.A.44:

Substantial Completion is further defined as (i) that degree of completion of the Project’s operating facilities or systems sufficient to provide Owner the full time, uninterrupted, and continuous beneficial operation of the Work; and (ii) required functional, performance and acceptance, or startup testing has been successfully demonstrated for components, devices, equipment, and instrumentation and control to the satisfaction of Engineer in accordance with the requirements of the Specifications.

SC-1.01. Add the following new paragraph immediately after Paragraph 1.01.A.51:

1.01.A.52. *Specialist*—The term Specialist refers to a person, partnership, firm, or corporation of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the Contract Documents, or otherwise performing Work required by the Contract Documents. Where the Specifications require the installation by a Specialist, that term shall also be deemed to mean either the manufacturer of the item, a person, partnership, firm, or corporation licensed by the manufacturer, or a

person, partnership, firm, or corporation who will perform the Work under the manufacturer's direct supervision.

SC-2.02. Amend first sentence in Paragraph 2.02.A to read as follows:

Owner will furnish to Contractor four hard copies of the Contract Documents and three copies of full-size Drawings.

SC-2.03. Delete the third sentence of Paragraph 2.03.A in its entirety.

SC-3.01. Add the following new paragraph immediately after Paragraph 3.01.C:

3.01.D. Sections of Division 01, General Requirements, govern the execution of the Work of all sections of the Specifications.

SC-4.02. Add the following new paragraph(s) immediately after Paragraph 4.02.B:

4.02.C. There are numerous technical reports associated with the facility. The most current report related to geotechnical conditions in and around the Project limits is provided in the Attachment to the Contract Documents (report drawings produced by Strata).

4.02.D. The following drawings of physical conditions relating to existing surface and subsurface structures at the Site (except Underground Facilities) are known to Owner:

4.02.D.1. See above Attachment A (report produced by Strata).

4.02.E. Copies of other reports and drawings that are not included with Bidding Documents may be examined at the Public Works Department office during regular business hours upon minimum 2-day notification of what technical information the Bidder is seeking. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner.

SC-4.05. Add the following new paragraphs immediately after Paragraph 4.05.A:

4.05.B. In accordance with Washington Administrative Code 332-120-030, Contractor shall search records and physical area of Site, including road or street resurfacing projects, for the purpose of locating and referencing any known or existing survey monuments.

4.05.C. In accordance with Washington Administration Code WAC 332-120-030, no survey monument shall be removed or destroyed before a permit is obtained from Washington's Department of Natural Resources.

4.05.D. After completion of the activity that caused the removal or destruction of the monument, if applicable, Contractor shall conduct remonumentation activities and file survey monumentation records in accordance with Washington Administrative Code 332-120-060.

SC-4.06. Add the following language at the end of Paragraph 4.06.A:

4.06.A. Solid waste handling and landfill-related hazards, including but not limited to, landfill gas, impacted groundwater, heavy equipment, and other solid waste handling hazards at the site and are within the scope of the Work for which the Contractor is responsible. The site is located adjacent to an old municipal landfill area and also an operating limited purpose landfill which collects inert-type wastes.

SC-4.06. Add the following language at the end of Paragraph 4.06.A:

The following reports or drawings regarding Hazardous Environmental Conditions at the Site are known to Owner:

4.06.A.1. Various nearby landfill monitoring results for impacted groundwater, landfill gas, air emissions monitoring and other relevant landfill-type monitoring data and information.

SC-5.01. Delete the first three sentences in Paragraph 5.01.A in their entirety and insert the following in their place:

Contractor shall furnish a combined performance and payment bond in the full amount of the Agreement, as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. This bond shall adhere to, at a minimum, the provisions included in the bond forms as made a part of the Contract, and shall remain in effect at least until 1 year after the final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents.

SC-5.01. Add the following new paragraph(s) immediately following Paragraph 5.01.C:

5.01.D. Letters of Credit:

5.01.D.1. Pursuant to Federal Procurement Regulations, letters of credit may be substituted for Performance and Payment Bonds. A separate letter of credit will be required for the Performance Bond and the Payment Bond, each in the full amount of the Contract Price. Provide Owner with irrevocable letters of credit from an acceptable federally insured financial institution that has an investment grade or higher rating from a recognized commercial rating service.

5.01.D.2. Letters of credit in excess of \$5 million must be confirmed by a second bank, with an acceptable rating, that has had a letter of credit business in the past year of at least \$25 million. Letter of credit coverage shall extend

through the correction period for performance guarantees and through the state specific period for bringing law suits for payment guarantees.

5.01.D.3. If sequential letters of credit are provided, it is Contractor's responsibility to replace the expiring letter of credit at least 30 days prior to the expiration date. Failure by Contractor to replace the expiring letter of credit may result in Owner drawing on the letter of credit.

SC-5.02. Add the following new paragraph immediately after Paragraph 5.02.A:

SC-5.02.B. Surety and insurance companies from which the bonds and insurance for this Project are purchased shall have an A.M. Best's rating of no less than VII, in addition to other requirements specified herein.

SC-5.04. Add the following language after Paragraph 5.04.B.1:

Include the following parties or entities as additional insured:

5.04.B.1.a. Whitman County, 400 N. Main Street, Washington 99111.

5.04.B.1.b. CH2M HILL, 322 E. Front Street, Suite 200, Boise, Idaho 83702.

SC-5.04. Add the following new paragraph immediately following Paragraph 5.04.B:

5.04.C. The limits of liability for the 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:

5.04.C.1. Workers' Compensation and related coverages under Paragraphs 5.04.A.1 and 5.04.A.2 of the General Conditions:

5.04.C.1.a. State: Statutory.

5.04.C.1.c. Employer's Liability: "Stop-Gap".

5.04.C.2. Contractor's General Liability under Paragraphs 5.04.A.3 through 5.04.A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

5.04.C.2.a. General Aggregate	\$1,000,000

5.04.C.2.b. Products - Completed Operations Aggregate	\$1,000,000

5.04.C.2.c. Personal and Advertising Injury (per person/Organization)	\$1,000,000

5.04.C.2.d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000

5.04.C.2.e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.

5.04.C.2.f. Excess or Umbrella Liability:

1) General Aggregate \$5,000,000

2) Each Occurrence \$5,000,000

5.04.C.3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

5.04.C.3.a. Bodily Injury:

Each Person \$1,000,000

Each Accident \$1,000,000

5.04.C.3.b. Property Damage:

Each Accident \$1,000,000

5.04.C.3.c. Combined Single Limit of \$1,000,000

5.04.C.4. Contractual Liability coverage required by Paragraph 5.04.B.3 of the General Conditions shall provide coverage for not less than the following amounts:

5.04.C.4.a. Bodily Injury:

Each Accident \$1,000,000

Annual Aggregate \$2,000,000

5.04.C.4.b. Property Damage:

Each Accident \$1,000,000

Annual Aggregate \$2,000,000

SC-5.06. Delete Paragraph 5.06.A in its entirety and insert the following in its place:

5.06.A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention. This insurance shall:

5.06.A.1. include the interests of Owner, Contractor, Subcontractors, Engineer and any other individuals or entities identified herein, and the officers, directors, members, partners, employees, agents, and other 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 loss payee;

5.06.A.2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss and 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 that caused by flood), and such other perils or causes of loss as may be specifically required by these Supplementary Conditions;

5.06.A.2.a. In addition to the above listed perils, the property insurance shall include \$5,000,000.

5.06.A.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);

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

5.06.A.5. allow for partial utilization of the Work by Owner;

5.06.A.6. include testing and startup;

5.06.A.7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued; and

5.06.A.8. Comply with the requirements of Paragraph 5.06.C of the General Conditions.

SC-5.06. Delete Paragraph 5.06.B in its entirety and insert the following in its place:

5.06.B. Equipment breakdown insurance is not required for this Project.

SC-5.06. Delete Paragraph 5.06.E in its entirety and insert the following in its place:

5.06.E. If Owner requests in writing that other special perils be included in the property insurance policies provided under Paragraphs 5.06.A or 5.06.B, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Owner by appropriate Change Order. Prior to commencement of the Work at the Site, Contractor shall, in writing, advise Owner whether or not such other insurance has been procured by Contractor.

SC-5.07. Delete the last sentence of Paragraph 5.07.A in its entirety and insert the following in its place:

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 Contractor as trustee or otherwise payable under any policy so issued.

SC-5.08. Delete Paragraph 5.08.A in its entirety and insert the following in its place:

5.08.A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Contractor and made payable to 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. 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, and the Work and the cost thereof covered by an appropriate Change Order.

SC-5.08. Delete Paragraph 5.08.B in its entirety and insert the following in its place:

5.08.B. 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 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, 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, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.

SC-5.10. Add the following language to the end of Paragraph 5.10.A:

The property insurance shall contain no partial occupancy restriction for utilization of the Project by Owner for the purpose intended.

SC-6.02. Add the following language to the end of Paragraph 6.02.B:

Contractor and Subcontractor regular working hours consist of 8 working hours within typical a 9-hour period between 7:00 a.m. and 4:00 p.m., excluding weekends

and holidays. Overtime work is work in excess of 40 hours per week. Extraordinary time that is related to Engineer's Overtime work, if onsite full time as the RPR, is more than 50-hour work weeks, and/or Weekends and Holidays). Refer to SC-6.02.C.

SC-6.02. Add the following new paragraph immediately after Paragraph 6.02.B:

6.02.C. Contractor shall reimburse Owner for Engineer's additional extraordinary costs for onsite personnel overtime work (more than 50-hour work weeks and/or Weekends and Holidays) resulting from Contractor's overtime operations. Reimbursement shall be on the cost basis defined in Paragraph 14.02.D.4 of these Supplementary Conditions.

SC-6.05. Add the following language at the end of Paragraph 6.05.E:

Reimbursement rates for Engineer or their officers, directors, members, partners, employees, agents, and other consultants and subcontractors for evaluation of proposed substitutes shall be on the basis established in Paragraph 14.02.D.4 of these Supplementary Conditions.

SC-6.06. Add the following language at the end of Paragraph 6.06.A:

Contractor shall perform a minimum of 30 percent of the onsite labor with its own employees.

SC-6.06. Add the following new paragraphs immediately after Paragraph 6.06.B:

6.06.B.1. The identity and acceptance of Subcontractors and Suppliers for the following portions of the Work is required in accordance with the requirements of the Bid Form.

SC-6.06. Add the following new paragraph immediately after Paragraph 6.06.G:

6.06.H. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

SC-6.08. Add the following new paragraphs immediately after Paragraph 6.08.A:

6.08.B. Contractor will be required to work collaboratively with the Owner in order to obtain the final Building Permit for the new WTB once Contractor supplies the pre-engineered metal building details and required professional seals. Owner will be granted the conditional permit in advance of the Contractor's mobilization to the site. The Owner will also be securing a final permit from the Health Department (and Washington State Department of Ecology) for design and operation of the waste handling facility. All other permits are the responsibility of the Contractor.

6.08.C. A copy of each permit is available at Owner's office, where applicable. Contractor shall examine the permits and conform to the requirements contained therein, including the purchase of additional bonds or insurance as specified therein, and such requirements are hereby made a part of these Contract Documents as fully and completely as though the same were set forth herein. Failure to examine the permit(s) will not relieve Contractor from compliance with the requirements stated therein. Within 5 days after the date of signing the Agreement, Contractor shall confer with an agent of the permitting agency so that insurance requirements and similar matters can be arranged prior to the time set for that portion of the Work.

SC-6.09. Add the following new paragraph(s) immediately after Paragraph 6.09.C:

6.09.D. While not intended to be inclusive of all Laws or Regulations for which Contractor may be responsible under Paragraph 6.09, the following Laws or Regulations are included as mandated by statute or for the convenience of Contractor:

6.09.D.1. Prevailing Wages:

6.09.D.1.a. Contractor shall pay not less than the prevailing rate of wages in accordance with Washington RCW 39.12.020. Certificates of wage payments by Contractor shall be submitted to the Department of Labor, with a copy to Owner, in accordance with RCW 39.12.040 and shall pay all fees associated therewith. Wage certification forms shall be provided by Contractor.

6.09.D.1.b. No worker, laborer, or mechanic employed in the performance of any part of this Agreement shall be paid less than the "prevailing rate of wage" as determined by the Industrial Statistician of the Department of Labor and Industries. The schedule of the prevailing wage rates for the locality or localities where this Agreement will be performed is by reference made a part of this Agreement as though fully set forth herein.

6.09.D.1.c. In case a dispute arises as to what are the prevailing rates of wages for work of a similar nature and such dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the Department of Labor and Industries of the State, and its decision therein shall be final and conclusive and binding on all parties involved in the dispute as provided for by RCW 39.12.060.

6.09.D.1.d. Owner does not guarantee that labor can be procured for the minimum wages in the wage scale. The rates of wages listed are minimum only, below which Contractor cannot pay, and they do not constitute a representation that labor can be procured for the minimum listed. Contractor shall ascertain the wages above the minimum set forth that may have to be paid.

6.09.D.2. Apprentices: In accordance with RCW 39.04.320, no less than 15 percent of labor hours shall be performed by apprentices.

SC-6.11. Add the following language to the end of Paragraph 6.11.A.1:

Contractor shall not enter upon nor use property not under Owner control until appropriate easements have been executed and a copy is on file at the Site.

SC-6.13. Add the following new paragraph immediately after 6.13.C:

6.13.C.1. The following Owner safety program(s) are applicable to the Work: General Solid Waste Handling Operations and Landfill Site Safety in conformance with the Owner's procedures and plans. Contractor shall incorporate by reference any and all such procedures into the Contractor's Health and Safety Plan as required in Section 01 50 00, Temporary Facilities and Controls.

SC-6.17. Add the following new paragraphs immediately after Paragraph 6.17.E.1:

6.17.E.2. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than the number of submittals specified in Paragraph 14.02.D.4 of these Supplementary Conditions. Engineer will record time for reviewing subsequent submittals requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time in accordance with Paragraph 14.02.D.4 of these Supplementary Conditions.

6.17.E.3. In the event Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time, unless the need for such substitution is beyond the control of Contractor.

SC-6.20. Add the following new paragraphs immediately after Paragraph 6.20.C:

6.20.D. For suits, actions, legal or administrative proceedings, Claims, demands, damages, losses, penalties, fines, costs, and expenses caused by or resulting from the concurrent negligence of Owner and Engineer, or Owner's or Engineer's agents or employees, and Contractor or Contractor's agents or employees, in situations where liability for damages arises from Claims of bodily injury to persons or damage to property, the preceding indemnity provision shall be valid and enforceable only to the extent of Contractor's negligence.

6.20.E. Contractor acknowledges that by entering into a Contract with Owner, Contractor has mutually negotiated the above indemnity provision with Owner.

6.20.F. Contractor's indemnity and defense obligations shall survive the termination or completion of the Work and remain in full force and effect until satisfied in full.

SC-8.11. Add the following new paragraph immediately after Paragraph 8.11.A:

8.11.B. On request of Contractor, prior to the execution of any Change Order involving a significant increase in the Contract Price, Owner will furnish to Contractor reasonable evidence that adequate financial arrangements have been made by Owner to enable Owner to fulfill the increased financial obligations to be undertaken by Owner as a result of such Change Order.

SC-8.13. Add the following new paragraph(s) immediately following Paragraph 8.12:

8.13. Owner As Resident Project Representative

8.13.A. In addition to the Resident Project Representative furnished by Engineer, Owner may choose to also furnish an Owner's Site representative to assist Engineer. The responsibilities, authorities, and limitations of authority of Owner's Site representative will be as specified for Engineer's Resident Project Representative.

SC-9.03. Add the following new paragraphs immediately after Paragraph 9.03.A:

9.03.B. A Resident Project Representative (RPR) may be furnished by Engineer as hired by the Owner. The responsibilities, authority, and limitations of the RPR are limited to those of Engineer in accordance with Paragraph 9.09 and as set forth elsewhere in the Contract Documents and are further limited and described below.

9.03.C. Responsibilities and Authority:

9.03.C.1. Schedules: Review and monitor Progress Schedule, Schedule of Submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

9.03.C.2. Conferences and Meetings: Conduct or attend meetings with Contractor, such as preconstruction conferences, progress meetings, Work conferences and other Project related meetings.

9.03.C.3. Liaison: (i) Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, and assist in understanding the intent of the Contract Documents; (ii) assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's onsite operations; (iii) assist in obtaining from Owner additional details or information when required for proper execution of the Work.

9.03.C.4. Interpretation of Contract Documents: Inform Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

9.03.C.5. Submittals: Receive submittals that are furnished at the Site by Contractor, and notify Engineer of availability for examination. Advise Engineer and Contractor of the commencement of any Work or arrival of materials and equipment at Site, when recognized, requiring a Shop Drawing or Sample if the submittal has not been approved by Engineer.

9.03.C.6. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and provide recommendations to Engineer; transmit to Contractor, in writing decisions as issued by Engineer.

9.03.C.7. Review of Work and Rejection of Defective Work: (i) Conduct onsite observations of the Work in progress to assist Engineer in determining if the Work is, in general, proceeding in accordance with the Contract Documents; (ii) inform Engineer and Contractor whenever RPR believes that any Work is defective; (iii) advise Engineer whenever RPR believes that any Work will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged or does not meet the requirements of any inspection test, or approval required to be made; and advise Engineer of that part of the Work in progress that RPR believes should be corrected or rejected or uncovered for observation, or requires special testing, inspection, or approval.

9.03.C.8. Inspections, Tests, and System Startups: (i) Verify tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that Contractor maintains adequate records thereof; (ii) observe, record, and report to Engineer appropriate details relative to the test procedures and system startups; and (iii) accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections, and report to Engineer.

9.03.C.9. Records: (i) Maintain records for use in preparing Project documentation; (ii) keep a diary or log book recording pertinent Site conditions, activities, decisions and events; (iii) record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractors, Subcontractors, and major Suppliers of materials and equipment.

9.03.C.10. Reports: (i) Furnish Engineer periodic reports of progress of the Work and of Contractor's compliance with the Progress Schedule and Schedule of Submittals; (ii) immediately notify Engineer of the occurrence of Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition; and (iii) assist Engineer in drafting proposed

Change Orders, Work Change Directives, and Field Orders; obtain backup material from Contractor as appropriate.

9.03.C.11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

9.03.C.12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify materials and equipment certificates and operation and maintenance manuals and other data required by Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents been delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

9.03.C.13. Completion: (i) Participate in a Substantial Completion inspection; assist in determination of Substantial Completion and the preparation of lists of items to be completed or corrected; (ii) Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied; and (iii) observe whether items on final list have been completed or corrected, and make recommendations to Engineer concerning acceptance.

9.03.D. Limitations of Authority: Resident Project Representative will not:

9.03.D.1. have authority to authorize a deviation from Contract Documents or substitution of materials or equipment, unless authorized by Engineer; or

9.03.D.2, exceed the limitations of Engineer's authority as set forth in Contract Documents; or

9.03.D.3. undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's authorized representative; or

9.03.D.4. advise on, issue directions relative to, or assume control over an aspect of the means, methods, techniques, sequences, or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents; or

9.03.D.5 advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor; or

9.03.D.6. participate in specialized field or laboratory tests or inspections conducted offsite by others, except as specifically authorized by Engineer; or

9.03.D.7. accept Shop Drawings or Samples from anyone other than Contractor; or

9.03.D.8. authorize Owner to occupy the Project in whole or in part.

SC-9.09. Add the following new paragraph immediately after Paragraph 9.09.E:

9.09.F. Contractors, Subcontractors, Suppliers, and others on the Project, or their sureties, shall maintain no direct action against Engineer, its officers, employees, affiliated corporations, and subcontractors, for any Claim arising out of, in connection with, or resulting from the engineering services performed. Only the Owner will be the beneficiary of any undertaking by Engineer.

SC-10.05. Delete Paragraphs 10.05.C through 10.05.E in their entirety and insert the following in their place and renumber Paragraph 10.05.F to read 10.05.D:

10.05.C. Engineer's Action and Executive Negotiation:

10.05.C.1. Engineer's Action:

10.05.C.1.a. Engineer will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. Engineer's written decision on such Claim, dispute or other matter will be final and binding upon Owner and Contractor, unless within 10 days after issuance of Engineer's written decision, either party appeals the decision by giving the other party and Engineer written notice of request for executive negotiation.

10.05.C.1.b. In the event Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

10.05.C.2. Executive Negotiation:

10.05.C.2.a. Within 10 days of the delivery of notice of appeal to Engineer's written decision regarding Claim, dispute or other matter, senior representatives of at least Owner and Contractor, having authority to settle the dispute, and Engineer shall meet at a mutually acceptable time and place, and thereafter as often as they reasonably deem necessary, to exchange relevant information and to attempt to resolve the dispute.

10.05.C.2.b. In the event a mutually acceptable decision cannot be reached through executive negotiation within 20 days of the appealing

party's notice, or mutually agreeable longer period, or if the party receiving such notice will not meet within 10 days, Owner or Contractor may make a written declaration, delivered to the other party and Engineer, that the executive negotiation is deemed unsuccessful and may initiate further dispute resolution measures in accordance with Article 16.

10.05.C.2.c. If no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to further appeal Engineer's written decision shall be delivered by Owner or Contractor to the other and to Engineer within 30 days after the date upon which the executive negotiation has been declared unsuccessful, or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by Owner and Contractor), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

SC-11.01. Delete Paragraph 11.01.A.5.c in its entirety and insert the following in its place:

11.01.A.5.c. Construction Equipment and Machinery:

11.01.A.5.c(1) Rentals of construction equipment and machinery, and the parts thereof in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. 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.

11.01.A.5.c(2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rental Rate Blue Book published by Equipment Watch, or other applicable publication as deemed acceptable by Engineer. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.

SC-11.01. Add the following language to the end of Paragraph 11.01.A.5.h:

Express and courier services must be approved prior to use.

SC-11.03. Delete Paragraph 11.03.D in its entirety and insert the following in its place:

11.03.D. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:

11.03.D.1. if the Bid price of a particular item of Unit Price Work amounts to 25 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

11.03.D.2. if there is no corresponding adjustment with respect to any other item of Work; and

11.03.D.3. if Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variation in the quantity of Unit Price Work performed.

SC-12.01. Add the following language to the end of Paragraph 12.01.C.2.c:

except, the maximum total allowable cost to Owner shall be the Cost of the Work plus a maximum collective aggregate fee for Contractor and tiered Subcontractors of 26.8 percent;

SC-12.01. Add the following new paragraph immediately after Paragraph 12.01.C:

12.01.D. In the event Contractor submits request for additional compensation as a result of a change or differing Site conditions, or as a result of delays, acceleration, or loss of productivity, Owner reserves right, upon written request, to audit and inspect Contractor's books and records relating to the Project. Upon written request for an audit, Contractor shall make its books and records available within 14 days of request. Owner shall specifically designate identity of auditor. As part of audit, Contractor shall make available its books and records relating to the Project, including but not limited to Bidding Documents, cost reports, payroll records, material invoices, subcontracts, purchase orders, daily timesheets, and daily diaries. Audit shall be limited to those cost items which are sought by Contractor in a change order or claim submission to Owner.

SC-12.03. Add the following new paragraph immediately after Paragraph 12.03.A:

12.03.B. In the context of “abnormal weather” for Delays, “abnormal weather” is defined as a storm event with a reoccurrence interval less frequent than every 10 years as registered by a local, nearby weather station. That is a 10-year event is NOT considered abnormal weather, but a 20-year event would be.

SC-13.03. Delete Paragraph 13.03.B in its entirety and insert the following in its place:

13.03.B. Contractor shall employ an independent testing laboratory/testing agency and shall be responsible for arranging and shall pay for specified tests, inspections, and approvals required for Owner’s and Engineer’s acceptance of the Work at the Site except:

13.03.B.1. costs incurred in connection with tests or inspections pursuant to Paragraph 13.04 shall be paid for as provided in said paragraph; and

13.03.B.2. as otherwise specifically provided in the Contract Documents.

SC-13.03. Add the following language at the end of Paragraph 13.03.D:

Tests required by Contract Documents for Contractor’s quality control testing to be performed by Contractor that require test certificates be submitted to Owner or Engineer for acceptance shall be made by an independent laboratory/testing agency that is licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. Owner through Engineer will be performing construction quality assurance testing to assure that Contractor’s testing is accurate and shall not be misconstrued to be testing done for Contractor’s quality control. In the event state license or certification is not required, testing laboratories or agencies shall meet the following applicable requirements:

13.03.D.1. Basic requirements of ASTM E329, “Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials used in Construction” as applicable.

13.03.D.2. Calibrate testing equipment at reasonable intervals by devices of accuracy, traceable to the National Institute of Standards and Technology or accepted values of natural physical constants.

SC-14.02. Add the following language at the beginning of Paragraph 14.02.A.1:

Prior to submitting initial payment invoice, Contractor and its Subcontractors shall provide Owner with “Statement of Intent to Pay Prevailing Wages” as required by RCW 39.12.040.

SC-14.02. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:

14.02.C.1. Forty-five (45) 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-14.02. Add the following new paragraph(s) immediately after Paragraph 14.02.D.3:

14.02.D.4. Items entitling Owner to retain set-offs from the amount recommended, including but not limited to:

14.02.D.4.a. Owner compensation to Engineer at a rate of \$150 per each extra personnel hour for labor plus expenses, if applicable, because of the following Contractor-caused events:

14.02.D.4.a.(1). return visits to manufacturing facilities to witness factory testing or retesting;

14.02.D.4.a.(2). Submittal review in excess of two reviews by Engineer for substantially the same submittal, in accordance with Paragraphs 6.17.E.2 and 6.17.E.3 of these Supplementary Conditions;

14.02.D.4.a.(3). evaluation of proposed substitutes and making changes to Contract Documents occasioned thereby, in accordance with Paragraph 6.05.E of these Supplementary Conditions;

14.02.D.4.a.(4). Overtime worked by Contractor necessitating Engineer, and their officers, directors, members, partners, employees, agents, and other consultants and subcontractors of each, Resident Project Representative or Resident Project Representative's Site staff, if any, to work extraordinary overtime in accordance with Paragraph 6.02.C. of these Supplementary Conditions. For purposes of administering this requirement, additional extraordinary overtime costs are defined work weeks more than 50 hours, and work on weekends and holidays.

14.02.D.4.a.(5). Oversight and inspection of defective work, or tests that have not been setup correctly requiring Engineer to come back and oversee/inspect such work.

14.02.D.4.b. Liability for liquidated damages incurred by Contractor as set forth in the Agreement.

SC-14.07. Add the following new paragraph immediately after Paragraph 14.07.A.3:

14.07.A.4. On contracts for public works, final payment of the retained percentage will not be made until after Contractor has filed with Owner the affidavit required by RCW 39.12.040 certifying Contractor and its Subcontractors have paid not less than the prevailing rate of wages.

SC-14.07. Add the following new paragraph immediately after Paragraph 14.07.B.1:

14.07.B.2. Upon Owner's receipt of (i) Engineer's written recommendation of payment with Contractor's Final Application for Payment and accompanying documentation, and (ii) Engineer's written notice that the Work is acceptable subject to the provisions of Paragraph 14.09, Owner will notify the Department of Revenue of the completion of the Work under these Contract Documents. Provided the Department of Revenue certifies there are no taxes or penalties due and owing from Contractor, and there are no other known Claims or Liens against the retained funds, Owner will make payment to Contractor in accordance with Paragraph 14.07 subject to the provisions of RCW 60.28.010. In the event unsatisfied Claims or Liens for taxes, material, labor, and other services are known to exist, an amount will be further withheld from the retainage sufficient to satisfy the settlement of such Claims and Liens, including attorney's fees incurred, and remainder will be released from escrow, or released from retained funds and paid to Contractor.

SC-15.03.A. Delete the first sentence of Paragraph 15.03.A in its entirety and insert the following in its place:

Upon 7 days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract or any portion of the Contract.

SC-16.01. Delete Paragraph 16.01 in its entirety and insert the following in its place:

SC-16.01 *Meet to Confer and Negotiate*

16.01.A. Engineer's action under Paragraph 10.05.C shall become final and binding 30 days after receipt of written notice of Engineer's action or decision unless, within that time period, Owner or Contractor gives to the other party written notice of intent to submit the Claim to a process of bilateral negotiations as set forth below.

16.01.B. Within 30 days of the delivery of such notice, Owner and Contractor shall meet and confer regarding the Claim. A good-faith effort to negotiate resolution shall be made by both parties.

16.01.C. If the negotiations contemplated by Paragraph SC-16.01.B are unsuccessful, management representatives of Owner and Contractor at least one tier above the

individuals who met under SC-16.01.B shall meet, confer, and negotiate within 30 days of the closure of the unsuccessful negotiations.

16.01.D. If the Claim is not resolved by negotiation, Engineer's action under Paragraph 10.05.C shall become final and binding 30 days after termination of the negotiations unless, within that time period, Owner or Contractor:

16.01.D.1. elects in writing to demand arbitration of the Claim, pursuant to Paragraph SC-16.02; or

16.01.D.2. agrees with the other party to submit the Claim to another dispute resolution process.

SC-16.02 *Arbitration*

16.02.A. All Claims or counterclaims, disputes, or other matters in question between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof (except for Claims which have been waived by the making or acceptance of final payment as provided by Paragraph 14.09) including but not limited to those not resolved under the provisions of Paragraph SC-16.01 will be decided by arbitration, subject to the conditions and limitations of this Paragraph SC-16.02. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.

16.02.B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the 30-day period specified in Paragraph SC-16.01.C, and in all other cases within a reasonable time after the Claim or counterclaim, dispute, or other matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such Claim or other dispute or matter in question would be barred by the applicable statute of limitations.

16.02.C. No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:

16.02.C.1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and

16.02.C.2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.

16.02.D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include: (i) a concise breakdown of the award; (ii) a written explanation of the award specifically citing the Contract Document provisions deemed applicable and relied on in making the award.

16.02.E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Controlling Law relating to vacating or modifying an arbitral award.

16.02.F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

END OF SECTION

AGREEMENT TO AFFIRMATIVE ACTION

As officers and representatives of _____,
we, the undersigned, have read and fully agree to comply with all applicable laws and
contract requirements for affirmative action to ensure Equal Employment Opportunity.

Signature

Title

Date

Signature

Title

Date

END OF SECTION

WASHINGTON PREVAILING WAGE RATES



THE APPLICABLE WASHINGTON MINIMUM PREVAILING WAGE RATES ARE CONTAINED IN THE PUBLICATION: **WASHINGTON STATE DEPARTMENT OF LABOR & INDUSTRIES PREVAILING WAGE LAW, APRIL 2009 EDITION**, (SEE LINKS AT <http://www.lni.wa.gov/IPUB/700-032-000.pdf>). INFORMATION IS ALSO AVAILABLE AT: <http://www.lni.wa.gov/tradeslicensing/prevwage/wagerates/> AND ARE INCORPORATED HEREIN AS THOUGH FULLY SET FORTH AS OF THE DATE THE **RFP** DOCUMENTS ARE FIRST ADVERTISED.

Reg. No. _____

Date _____

**STATEMENT OF INTENT TO PAY PREVAILING WAGE
ON PUBLIC WORKS CONTRACT**

Awarding Agency _____

Contract Number _____

Date Contract Awarded _____

Date Work Commencing _____

County in Which Work Performed _____

State of Washington Location Within County _____

County of Whitman Prime Contractor _____

Do You Intend to use Subcontractors? _____

In compliance with RCW 39.12.040 I, the undersigned, being a duly authorized representative of

Contractor or Subcontractor Address

do hereby certify that the following rates of hourly wage and hourly fringe benefits will be paid to all laborers, workmen, and mechanics employed by me upon the public works project described above and that no laborer, workman, or mechanic will be paid less than the "Prevailing Rate of Wage" as determined by the Industrial Statistician of the Department of Labor and Industries.

CRAFT AND CLASSIFICATION OF LABOR	Rate of Hourly Pay	Rate of Hourly Fringe Benefits

NOTE: Attach additional sheets as needed.

_____ This _____ day of _____, 20____

By _____
Authorized Representative Notary Public in and for the State of Washington

The purpose of this statement is to provide evidence of intent to comply with the prevailing wage requirements of Chapter 39.12 RCW. IT IS PRELIMINARY FILING ONLY and cannot be construed as application for certification by the Director of Labor and Industries that the prevailing wage requirements as set forth in RCW 39.12.040 have been satisfied.

This space reserved for Director's Approval

APPROVED: Department of Labor and Industries Statistician

By: _____ Date _____

BEFORE FINAL SETTLEMENT CAN BE MADE in connection with any public works project, it will be necessary for the Contractor and any Subcontractor to produce evidence of certification by the Director that prevailing wages, including fringe benefits, have been paid to each classification of laborers, workmen, or mechanics employed on said project. Form S.F. 9843, "Affidavit of Wages Paid," or a similarly constructed form, should be submitted for the Director's Certification. These forms are available upon request from any office of the Department of Labor and Industries.

PROGRAM PAYMENTS: Each voucher claim submitted to an Owner by a Contractor for payment on a project estimate shall state that prevailing wages have been paid in accordance with the pre-filed statement or statements of intent to pay prevailing wages on file with the public agency.

COMPLETE AND MAIL ENTIRE SET FOR APPROVAL TO:

Industrial Relations Division, Department of Labor and Industries, General Administration Building, Olympia, Washington 98504.

END OF SECTION

AFFIDAVIT OF WAGES PAID ON PUBLIC WORKS CONTRACT

Awarding Agency _____
Contract Number _____
Date Contract Awarded _____
Date Contract Completed _____
County in Which Work Performed _____
State of Washington Location Within County _____
County of Whitman Was a Statement of Intent Filed? _____

In compliance with RCW 39.12.040 I, the undersigned, being a duly authorized representative of

Contractor or Subcontractor

Address

do hereby certify that the following rates of hourly wage and hourly fringe benefits have been paid to all laborers, workmen, and mechanics employed by me upon the public works project described above and that no laborer, workman, or mechanic has been paid less than the "Prevailing Rate of Wage" as determined by the Industrial Statistician of the Department of Labor and Industries.

List below each classification of labor employed by you upon the project described above and the hourly pay and hourly fringe benefits paid to each classification. If apprentices have been employed, their names and/or registration numbers, their stages of progression, the rate of hourly pay, and the rate of hourly fringe benefits paid to each apprentice.

CRAFT AND CLASSIFICATION OF LABOR

Rate of
Hourly Pay

Rate of Hourly
Fringe Benefits

NOTE: Attach additional sheets as needed.

Company Name

Subscribed and sworn to me

By _____

This _____ day of _____, 20__

Notary Public in and for the State of Washington, residing in Washington

END OF SECTION

PART 3

SPECIFICATIONS

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The completed Work will provide Owner with a new waste transfer building and site improvements at the Whitman County Carothers Road Solid Waste Facility.
- B. Refer to Section 01 64 00, Owner-Furnished Products.
- C. The Work is broken down into the following items (in coordination with Section 00 41 13, Bid Form, and Section 01 29 00, Payment Procedures):

1. Lump Sum (LS) Bid Items:

Item ID	Description	Summary of Work
LS-1	General Conditions	Lump Sum (LS) - As required by the Construction Contract, including but not limited to, Bonds, Insurance, Mobilization, Demobilization, Engineer's Overtime, Permits, Contractor Quality Control, and Contract Closeout.
LS-2	Temporary Facilities & Temporary Erosion and Sediment Controls	Lump Sum (LS) - As required by the Construction Contract, including but not limited to, Temporary Facilities, and Temporary Erosion and Sediment Control systems and features.

2. Unit Price (UP) Bid Items:

Item ID	Description	Summary of Work
UP-1	Site Preparation	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to preparing the Site for construction, including, but not limited to, before start of Work survey, survey staking and survey control system setup, Site clearing and grubbing (and cleanup activities), material stockpiling, temporary access roads, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-2	General Site/Yard Work	Unit Price (US) - This Bid Item covers all site civil and yard-related general work, materials, and equipment, including, but not limited to, layout staking and survey control, progress and as-built surveys, subgrade preparation, stormwater collection and conveyance systems (stormwater pipes, culverts, catch basins, stormwater ditches, riprap discharge aprons, valley gutters, stormwater infiltration basin, etc.), yard ecology blocks, traffic control, sidewalks, the roll-off container pad and contact water catch basin on the south side of the new WTB, approach pads at the new commercial truck scale, coordination with utility companies, Contractor's quality control testing, coordination with Owner's special inspections, and all other work, materials, and equipment included to complete this Bid Item.
UP-3	General Site Excavation	Unit Price (CY) - This Bid Item covers all Work, materials, and equipment related to the general excavation for the Site (not included in other bid items), including, but not limited to, survey staking and control, progress and as-built surveys, material segregation, material stockpiling, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.
UP-4	General Site Fill	Unit Price (CY) - This Bid Item covers all Work, materials, and equipment related to general fill for the Site (not included in other bid items), including, but not limited to, survey staking and control, progress and as-built surveys, imported fill (if necessary), Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.
UP-5	Gravel Access Roads/Pads	Unit Price (SY) - This Bid Item covers all Work, materials, and equipment related to the gravel surfaced access roads/pads for improvement to the facility and new areas related to the new WTB, including, but not limited to, layout staking and survey control, progress and as-built surveys, subgrade preparation, crushed base surfacing, gravel surfacing, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-6	ACP Access Roads/Pads	Unit Price (SY) - This Bid Item covers all Work, materials, and equipment related to the asphalt concrete pavement (ACP) access roads/pads for improvement to the facility and new areas related to the new WTB, including, but not limited to, layout staking and survey control, progress and as-built surveys, subgrade preparation, crushed base surfacing, hot-mix asphalt, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.
UP-7	Gravity Block Wall	Unit Price (SF) - This Bid Item covers all Work, materials, and equipment related to the gravity block wall located on the east side of the new waste transfer building, including, but not limited to, layout staking and survey control, as-built surveys, subgrade preparation, granular drain media behind wall, structural fill/rock surfacing and geogrid at surface of wall, wall drain collection system (to where it connects to yard drain), final wall design, wall installation, Contractor's quality control, coordination with Owner's special inspections, and all other work, materials, and equipment included to complete this Bid Item.
UP-8	Domestic Waterline	Unit Price (LF) - This Bid Item covers all Work, materials, and equipment related to the installation of the new domestic waterline, including, but not limited to, layout staking and survey control, as-built surveys, trench excavation and fill, trench safety systems, trench preparation, trench backfill, piping and fittings, valves, valve boxes, tie-in connection with the existing well discharge line and its connection to the new WTB, disinfection and health district-related certification testing, performance testing, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-9	Contact Water Gravity Lines	Unit Price (LF) - This Bid Item covers all Work, materials, and equipment related to the installation of the contact water (CW) gravity lines (yard piping), including, but not limited to, layout staking and survey control, as-built surveys, trench excavation and fill, trench safety systems, trench preparation, trench backfill, piping and fittings, valves, tie-in connection with the existing contact water drain line near the lined pond, tie-in connection to the catch basins, connection to the gravity lines from the new WTB, connection to the catch basins at the z-wall and south side roll-off loading pad, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item. The cleanouts and CW manhole are incidental to this Bid Item.
UP-10	Contact Water Pressure Line	Unit Price (LF) - This Bid Item covers all Work, materials, and equipment related to the installation of the contact water (CW) pressure line (yard piping), including, but not limited to, layout staking and survey control, as-built surveys, trench excavation and fill, trench safety systems, trench preparation, trench backfill, piping and fittings, valves, tie-in connection with the CW manhole and CW lift station valve vault, Contractor's quality control, testing, and all other work, materials, and equipment included to complete this Bid Item.
UP-11	Contact Water Lift Station	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of the contact water (CW) lift station, including, but not limited to, excavation and fill, the wetwell (manhole), connection to the contact water gravity lines, valve vault, piping in the pump station and valve vault to where it connects with the yard CW pressure line, pumps, valves, instrumentation and controls, testing, system startup/commissioning, training, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-12	Sanitary Sewer Gravity Line	Unit Price (LF) - This Bid Item covers all Work related to the installation of the sanitary sewer gravity line (yard piping), including, but not limited to, layout staking and survey control, as-built surveys, trench excavation and fill, trench safety systems, trench preparation, trench backfill, piping and fittings, tie-in connection to the existing septic tank, cleanouts, Contractor's quality control, coordination with the Owner for testing and permitting, and all other work, materials, and equipment included to complete this Bid Item. Sanitary sewer manholes are incidental to this Bid Item.
UP-13	Sanitary Sewer Pressure Line	Unit Price (LF) - This Bid Item covers all Work, materials, and equipment related to the installation of the sanitary sewer pressure line (yard piping), including, but not limited to, layout staking and survey control, as-built surveys, trench excavation and fill, trench safety systems, trench preparation, trench backfill, piping and fittings, tie-in connection to the manhole, cleanouts, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.
UP-14	Site/Yard Electrical and Lighting	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of the electrical and lighting systems in the Site/yard of the facility, including, but not limited to, electrical connection to the existing service, metering can, transformer and transformer mounting pad, electrical conductors and conduits, coordination with Avista, light poles and foundation supports, trenching and backfill, trench safety systems, connection to the WTB, connection to the commercial truck scale, telecommunication line between the new commercial truck scale and existing scale house, provisions for future telecommunication line from the new pit scales to the existing scale house, connection to the main service panel board in the WTB, connection to the new contact water lift station, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-15	Commercial Truck Scale	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of the commercial truck scale, including, but not limited to, structural systems, coordination with the scale manufacturer/supplier, scale and scale system ancillaries, card-reader system, intercom system, CCTV system, power and communication systems and connections, startup/commissioning, training, Contractor's quality control, scale certification, and all other work, materials, and equipment included to complete this Bid Item.
UP-16	WTB - General Excavation	Unit Price (CY) - This Bid Item covers all Work, materials, and equipment related to the general excavation in and around the new waste transfer building (WTB) including, but not limited to, survey staking and control, progress and as-built surveys, safety support (shoring systems), coordination with ongoing preloading monitoring activities (where applicable), material segregation, material stockpiling, Contractor's quality control, coordinating with Owner's special inspections and building officials, and all other work, materials, and equipment included to complete this Bid Item.
UP-17	WTB - General Fill	Unit Price (CY) - This Bid Item covers all Work, materials, and equipment related to general fill for the new waste transfer building (WTB) including, but not limited to, survey staking and control, progress and as-built surveys, placement and compaction of shot rock (reused preload shot rock material) up to structural fill level, Contractor's quality control, coordinating with Owner's special inspections and building officials, and all other work, materials, and equipment included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-18	WTB - Structural Fill	Unit Price (CY) - This Bid Item covers all Work, materials, and equipment related to structural fill for the new waste transfer building (WTB), including, but not limited to, survey staking and control, progress and as-built surveys, placement and compaction of maintenance rock (reused preload maintenance rock material), import of additional structural fill material (if applicable), Contractor's quality control, coordinating with Owner's special inspections and building officials, and all other work, materials, and equipment included to complete this Bid Item. Subgrade preparation for concrete placement is (for building footings, foundations, and floors) incidental to this Bid Item.
UP-19	WTB - Architectural and Structural	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to architectural and structural features of the new waste transfer building (WTB), including, but not limited to, survey staking and control, as-built survey, concrete, pre-engineered metal building, building construction/erection, coordinating with pre-engineered metal building supplier for building design details, building anchorage systems and design, furnishings, doors and panels, metal armoring/plating, armored push walls, interior ecology blocks, exterior sidewalk retaining wall, guardrails, interior framing, walls and finishes, Contractor's quality control, coordinating with Owner's special inspections and building officials, and all other work, materials, and equipment included to complete this Bid Item.
UP-20	WTB - Mechanical	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of the mechanical systems at the new waste transfer building (WTB), including, but not limited to, ventilation fans, hot water heater, safety shower/eye wash station, hose bibs, heaters, piping, hot water recirculation system, catch basins in the lower level of the building, contact water (CW) gravity lines in the lower level of the building, natural gas line systems connecting to service, duplex sewer pump station, Contractor's quality control, and all other work included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-21	WTB - Electrical and Lighting	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of the electrical and lighting system at the new waste transfer building (WTB) (from the main service panel, and including the main service panel, to the electrical loads inside the building), including, but not limited to, the main service panel board (with portable generator connection point), distribution panel board, electrical service connections to the knuckleboom crane, lights, overhead doors, step-down transformer and feeders, lighting panel board, fire alarm control panel, fire alarm pull stations, fire alarm horns/beacons, electrical connection to sanitary sewer pump station, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.
UP-22	Installation of Owner-furnished Knuckleboom Crane	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of the Owner-furnished knuckleboom crane, including but not limited to, coordination with the Owner, taking receipt and responsibility of the equipment, bolts and mounting hardware, startup/commissioning, testing, Contractor's quality control, and all other work, materials, and equipment included to complete this Bid Item.
UP-23	WTB - Axle-Pit Scales	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to the installation of axle-pit scales in the lower level of the new waste transfer building (WTB), including, but not limited to, coordination with the scale manufacturer/supplier, scales and scale system ancillaries, power connection and communications, kiosk printer, reader boards, startup/commissioning, training, Contractor's quality control, and all other work included to complete this Bid Item.

Item ID	Description	Summary of Work
UP-24	Z-Wall - Architectural and Structural	Unit Price (US) - This Bid Item covers all Work, materials, and equipment related to architectural and structural features of the z-wall, including but not limited to, layout staking and survey control, as-built survey, concrete wall and pads, pre-engineered super structure (canopy), granular drain media behind wall, wall drain collection system (to where it connects to yard drain), canopy construction/erection, coordinating with pre-engineered metal building supplier for building design details, building anchorage and design, metal deflector chute, drop-gate system, protective bollards, concrete pads and CW catch basins, Contractor's quality control, coordinating with Owner's special inspections and building officials, and all other work, materials, and equipment included to complete this Bid Item.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 PROPOSAL REQUESTS

- A. Owner may, in anticipation of ordering an addition, deletion, or revision to the Work, request Contractor to prepare a detailed proposal of cost and times to perform contemplated change.
- B. Proposal request will include reference number for tracking purposes and detailed description of and reason for proposed change, and such additional information as appropriate and as may be required for Contractor to accurately estimate cost and time impact on Project.
- C. Proposal request is for information only; Contractor is neither authorized to execute proposed change nor to stop Work in progress as result of such request.
- D. Contractor's written proposal shall be transmitted to Owner/Engineer promptly, but not later than 14 days after Contractor's receipt of Owner's written request. Proposal shall remain firm for a maximum period of 45 days after receipt by Owner/Engineer.
- E. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a Claim for an adjustment in Contract Price or Contract Times (or Milestones).

1.02 CLAIMS

- A. Include, at a minimum:
 - 1. Specific references including (i) Drawing numbers, (ii) Specification section and article/paragraph number, and (iii) Submittal type, Submittal number, date reviewed, Owner/Engineer's comment, as applicable, with appropriate attachments.
 - 2. Stipulated facts and pertinent documents, including photographs and statements.
 - 3. Interpretations relied upon.
 - 4. Description of (i) nature and extent of Claim, (ii) who or what caused the situation, (iii) impact to the Work and work of others, and (iv) discussion of claimant's justification for requesting a change to price or times or both.
 - 5. Estimated adjustment in price claimant believes it is entitled to with full documentation and justification.

6. Requested Change in Contract Times: Include at least (i) Progress Schedule documentation showing logic diagram for request, (ii) documentation that float times available for Work have been used, and (iii) revised activity logic with durations including subnetwork logic revisions, duration changes, and other interrelated schedule impacts, as appropriate.
7. Documentation as may be necessary as set forth below for Work Change Directive, and as Owner/Engineer may otherwise require.

1.03 WORK CHANGE DIRECTIVES

A. Procedures:

1. Engineer will:
 - a. Initiate, including a description of the Work involved and any attachments.
 - b. Affix signature, demonstrating Engineer's recommendation.
 - c. Transmit electronic copy to Owner for authorization.
2. Owner will:
 - a. Affix signature, demonstrating approval of the changes involved.
 - b. Return electronic copy to Engineer, who will retain one copy, send one copy to the Resident Project Representative or other field representative, and forward electronic copy to Contractor.
3. Upon completion of Work covered by the Work Change Directive or when final Contract Times and Contract Price are determined, Contractor shall submit documentation for inclusion in a Change Order.
4. Contractor's documentation shall include but not be limited to:
 - a. Appropriately detailed records of Work performed to enable determination of value of the Work.
 - b. Full information required to substantiate resulting change in Contract Times and Contract Price for Work. On request of Engineer, provide additional data necessary to support documentation.
 - c. Support data for Work performed on a unit price or Cost of the Work basis with additional information such as:
 - 1) Dates Work was performed, and by whom.
 - 2) Time records, wage rates paid, and equipment rental rates.
 - 3) Invoices and receipts for materials, equipment, and subcontracts, all similarly documented.

- B. Effective Date of Work Change Directive: Date of signature by Owner, unless otherwise indicated thereon.

1.04 CHANGE ORDERS

A. Procedure:

1. Engineer will prepare an electronic copy of proposed Change Order and transmit such with Engineer's written recommendation and request to Contractor for signature.
2. Contractor shall, upon receipt, either: (i) promptly sign copies, retaining one for its file, and return electronic copy to Engineer for Owner's signature, or (ii) return unsigned electronic copy with written justification for not executing Change Order.
3. Engineer will, upon receipt of Contractor signed copies, promptly forward Engineer's written recommendation and partially executed electronic copy for Owner's signature, or if Contractor fails to execute the Change Order, Engineer will promptly so notify Owner and transmit Contractor's justification to Owner.
4. Upon receipt of Contractor-executed Change Order, Owner will promptly either:
 - a. Execute Change Order, retaining an electronic copy for its file and returning an electronic copy to Engineer; or
 - b. Return to Engineer unsigned copies with written justification for not executing Change Order.
5. Upon receipt of Owner-executed Change Order, Engineer will transmit an electronic copy to Contractor, one copy to Resident Project Representative or other field representative, and retain one copy, or if Owner fails to execute the Change Order, Engineer will promptly so notify Contractor and transmit Owner's justification to Contractor.
6. Upon receipt of Owner-executed Change Order, Contractor shall:
 - a. Perform Work covered by Change Order.
 - b. Revise Schedule of Values to adjust Contract Price and submit with next Application for Payment.
 - c. Revise Progress Schedule to reflect changes in Contract Times, if any, and to adjust times for other items of Work affected by change.
 - d. Enter changes in Project record documents after completion of change related Work.

B. In signing a Change Order, Owner and Contractor acknowledge and agree that:

1. Stipulated compensation (Contract Price or Contract Times, or both) set forth includes payment for (i) the Cost of the Work covered by the Change Order, (ii) Contractor's fee for overhead and profit, (iii) interruption of Progress Schedule, (iv) delay and impact, including cumulative impact, on other Work under the Contract Documents, and (v) extended overheads.

2. Change Order constitutes full mutual accord and satisfaction for the change to the Work.
3. Unless otherwise stated in the Change Order, all requirements of the original Contract Documents apply to the Work covered by the Change Order.

1.05 COST OF THE WORK

- A. In determining the supplemental costs allowed in Paragraph 11.01.A.5 of the General Conditions for rental equipment and machinery, the following will apply.
- B. Rental of construction equipment and machinery and the parts thereof having a replacement value in excess of \$1,000, whether owned by Contractor or rented or leased from others, shall meet the following requirements:
 1. Full rental costs for leased equipment shall not exceed rates listed in the Rental Rate Blue Book published by Equipment Watch, as adjusted to the regional area of the Project. Owned equipment costs shall not exceed the single shift rates established in the Cost Reference Guide (CRG) published by Equipment Watch. The most recent published edition in effect at commencement of actual equipment use shall be used.
 2. Rates shall apply to equipment in good working condition. Equipment not in good condition, or larger than required, may be rejected by Engineer or accepted at reduced rates.
 3. Leased Equipment: For equipment leased or rented in arm's length transactions from outside vendors, maximum rates shall be determined by the following actual usage/Payment Category:
 - a. Less than 8 hours: Hourly rate.
 - b. 8 or more hours but less than 7 days: Daily rate.
 - c. 7 or more days but less than 30 days: Weekly rate.
 - d. 30 days or more: Monthly rate.
 4. Arm's length rental and lease transactions are those in which the firm involved in the rental or lease of equipment is not associated with, owned by, have common management, directorship, facilities and/or stockholders with the firm renting the equipment.
 5. Leased Equipment in Use: Actual equipment use time documented by Engineer shall be the basis that equipment was on and utilized at the Project Site. In addition to the leasing rate above, equipment operational costs shall be paid at the estimated hourly operating cost rate set forth in the Blue Book if not already included in the lease rate. Hours of operation shall be based upon actual equipment usage to the nearest quarter hour, as recorded by Engineer.
 6. Leased Equipment, When Idle (Standby): Idle or standby equipment is equipment onsite or in transit to and from the Work Site and necessary to

- perform the Work under the modification, but not in actual use. Idle equipment time, as documented by Engineer, shall be paid at the leasing rate determined above, excluding operational costs.
7. Owned and Other Equipment in Use: Equipment rates for owned equipment or equipment provided in other than arm's length transaction shall not exceed the single shift total hourly costs rate developed in accordance with the CRG and as modified herein for multiple shifts. This total hourly rate will be paid for each hour the equipment actually performs work. Hours of operation shall be based upon actual equipment usage as recorded by Engineer. This rate shall represent payment in full for Contractor's direct costs.
 8. Owned and Other Equipment, When Idle (Standby): Equipment necessary to be onsite to perform the Work on single shift operations, but not utilized, shall be paid for at the ownership hourly expense rate developed in accordance with the CRG, provided its presence and necessity onsite has been documented by Engineer. Payment for idle time of portions of a normal workday, in conjunction with original contract Work, will not be allowed. In no event shall idle time claimed in a day for a particular piece of equipment exceed the normal Work or shift schedule established for the Project. It is agreed that this rate shall represent payment in full for Contractor's direct costs. When Engineer determines that the equipment is not needed to continuously remain at the Work Site, payment will be limited to actual hours in use.
 9. Owned and Other Equipment, Multiple Shifts: For multiple shift operations, the CRG single shift total hourly costs rate shall apply to the operating equipment during the first shift. For subsequent shifts, up to two in a 24-hour day, operating rate shall be the sum of the total hourly CRG operating cost and 60 percent of the CRG ownership and overhaul expense. Payment for idle or standby time for second and third shifts shall be 20 percent of the CRG ownership and overhaul expense.
 10. When necessary to obtain owned equipment from sources beyond the Project limits, the actual cost to transfer equipment to the Site and return it to its original location will be allowed as an additional item of expense. Move-in and move-out allowances will not be made for equipment brought to the Project if the equipment is also used on original Contract or related Work.
 11. If the move-out destination is not to the original location, payment for move-out will not exceed payment for move-in.
 12. If move is made by common carrier, the allowance will be the amount paid for the freight. If equipment is hauled with Contractor's own forces, rental will be allowed for the hauling unit plus the hauling unit operator's wage. If equipment is transferred under its own power, the rental will be 75 percent of the appropriate total hourly costs for the equipment, without attachments, plus the equipment operator's wage.
 13. Charges for time utilized in servicing equipment to ready it for use prior to moving and similar charges will not be allowed.

14. When a breakdown occurs on any piece of owned equipment, payment shall cease for that equipment and any other owned equipment idled by the breakdown.
15. If any part of the Work is shut down by Owner, standby time will be paid during nonoperating hours if diversion of equipment to other Work is not practicable. Engineer/Owner reserves the right to cease standby time payment when an extended shutdown is anticipated.
16. If a rate has not been established in the CRG for owned equipment, Contractor may:
 - a. If approved by Engineer, use the rate of the most similar model found, considering such characteristics as manufacturer, capacity, horsepower, age, and fuel type, or
 - b. Request Equipment Watch to furnish a written response for a rate on the equipment, which shall be presented to Engineer for approval; or
 - c. Request Engineer to establish a rate.

1.06 FIELD ORDER

- A. Engineer will issue Field Orders, with three copies to Contractor.
- B. Effective date of the Field Order shall be the date of signature by Engineer, unless otherwise indicated thereon.
- C. Contractor shall acknowledge receipt by signing and returning one copy to Engineer.
- D. Field Orders will be incorporated into subsequent Change Orders, as a no-cost change to the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Schedule of Values: Submit on Contractor's standard form as approved by Engineer.
2. Schedule of Estimated Progress Payments:
 - a. Submit with initially acceptable Schedule of Values.
 - b. Submit adjustments thereto with Application for Payment.
3. Application for Payment.
4. Final Application for Payment.

1.02 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.
- B. Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- D. Lump Sum Work: List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.
- E. An unbalanced or front-end loaded schedule will not be acceptable.
- F. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.

1.03 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.04 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application (Request) for Payment and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.
- B. Use detailed Application for Payment Form suitable to Owner/Engineer.
- C. Provide separate form for each schedule as applicable.
- D. Include accepted Schedule of Values for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Engineer.
- F. Preparation:
 - 1. Round values to nearest dollar.
 - 2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by Engineer.

1.05 MEASUREMENT—GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.
- B. Whenever pay quantities of material are determined by weight, material shall be weighed on scales furnished by Contractor and certified accurate by state agency responsible. Weight or load slip shall be obtained from weigher and delivered to Owner's representative at point of delivery of material.
- C. Location and elevation of established control points are shown on Drawings.

D. Contractor's Responsibilities:

1. Retain professional land surveyor registered in Washington who shall perform or supervise engineering surveying necessary for as-built surveys and quantity measurements. Surveyor shall produce electronic submittals of the finished triangulated surfaces in:
 - a. MicroStation and InRoads software platforms, or
 - b. AutoCAD software platforms. If AutoCAD format is used, then the surface model's triangles must be displayed in 3-D format in the AutoCAD file. Softdesk or Land development *.tin files will not be accepted.
 - c. In addition, all survey data points shall be submitted in an Excel spreadsheet or delimited text file formatted with point number, northing, easting, elevation, and description.
 - d. Cross-sections will not be accepted.
 - e. All submitted survey information shall include the ties to the construction survey control points.
2. Provide competent survey employee(s), tools, software, computers, stakes, and other equipment and materials as required to perform the survey work specified.
3. Provide additional construction control points as needed to survey the Work. Some established control points might be destroyed during construction. Contractor's licensed surveyor shall be responsible for replacing destroyed construction control points with like control points.
4. For any additional control points established by the Contractor for the Work, the Contractor shall provide Engineer with an electronic file of the newly added control points and identification markings.
5. Maintain complete accurate log of survey Work as it progresses as a Record Document.
6. On request of Engineer, submit documentation.
7. Provide Surveys for:
 - a. Entire Project area prior to start of Work.
 - b. Finished prepared subgrade surfaces.
 - c. As-builts for excavation surface and fill subgrade surfaces. Excavation payment is for the difference between the before survey and as-built excavated surface. Fill payment is for the difference between before survey and as-built fill subgrade surface.
 - d. Domestic waterline, sewer lines, and contact water lines, manholes, valves, and all other applicable features.
 - e. Building finish corners, z-wall area, and gravity block wall. Finish floor survey inside the new WTB.
 - f. Top of road and pad finish surface.
 - g. Finished stormwater ditches and infiltration basin.
8. The Contractor shall submit, at a minimum, the following for survey. Submit for review, acceptance, and payment prior to proceeding with

subsequent work that will alter the as-built (as-constructed) finished surfaces:

- a. Roads: Survey points at 20-foot intervals and 0.25-foot cord height intervals on horizontal curves unless otherwise indicated. Survey superelevation application stations, horizontal and vertical alignment points of curvature, and points of tangent locations.
 - 1) Road Surfacing: Survey centerline, shoulder break-lines, edge of base, with 20-foot grid points over the entire surface area.
 - b. Other Areas: Survey grid points at 25-foot intervals.
9. Final as-built mapping capturing ALL Work areas and major features not already provided for earlier payment (progress) surveys.
- E. Lump Sum (LS): Unit is one; no measurement will be made.
- F. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
EA	Each—Field Count by Engineer
LF	Linear Foot—Field Measure by Engineer
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)
US	Unit Sum – Unit is one; Bid Item costs are consolidated into a single unit sum item (similar to a lump sum item but paid as unit price under the UP schedule)

1.06 PAYMENT

- A. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
- B. Payment for unit price items covers all the labor, materials, and services necessary to furnish and install unit price items.
- C. Payment will be made by Owner within 45 days of Engineer's approval of Contractor's Application for Payment.

D. Payment Schedule:

1. Lump Sum (LS) Items:

Item ID	Item	Unit	Measurement of Payment
LS-1	General Conditions	LS	Paragraph 1.05.E
LS-2	Temporary Facilities & Temporary Erosion and Sediment Controls	LS	Paragraph 1.05.E

2. Unit Price (UP) Items:

Item ID	Item	Unit	Measurement of Payment
UP-1	Site Preparation	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-2	General Site/Yard Work	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-3	General Site Excavation	CY	Paragraph 1.05.D&F; payment is by cubic yard (CY) of before and after survey of the excavation areas to the nearest whole number.
UP-4	General Site Fill	CY	Paragraph 1.05.D&F; payment is by cubic yard (CY) of before and after survey of the excavation areas to the nearest whole number.
UP-5	Gravel Access Roads/Pads	SY	Paragraph 1.05.D&F; payment is by square yard (SY) of completed area of gravel surfaced access roads/pads to the nearest whole number.
UP-6	ACP Access Roads/Pads	SY	Paragraph 1.05.D&F; payment is by square yard (SY) of completed area of ACP access roads/pads to the nearest whole number.
UP-7	Gravity Block Wall	SF	Paragraph 1.05.D&F; payment is by square foot (SF) of exposed, projected vertical face of the wall installed from bottom to top of wall not including wall batter, to the nearest whole number.

Item ID	Item	Unit	Measurement of Payment
UP-8	Domestic Waterline	LF	Paragraph 1.05.D&F; payment is by the linear foot (LF) of installed domestic water pipeline, to the nearest whole number.
UP-9	Contact Water Gravity Lines	LF	Paragraph 1.05.D&F; payment is by the linear foot (LF) of installed contact water (CW) gravity pipelines, to the nearest whole number.
UP-10	Contact Water Pressure Line	LF	Paragraph 1.05.D&F; payment is by the linear foot (LF) of installed contact water (CW) pressure pipelines, to the nearest whole number.
UP-11	Contact Water Lift Station	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-12	Sanitary Sewer Gravity Line	LF	Paragraph 1.05.D&F; payment is by the linear foot (LF) of installed sanitary sewer gravity pipeline, to the nearest whole number.
UP-13	Sanitary Sewer Pressure Line	LF	Paragraph 1.05.D&F; payment is by the linear foot (LF) of installed sanitary sewer pressure pipeline, to the nearest whole number.
UP-14	Site/Yard Electrical and Lighting	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-15	Commercial Truck Scale	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-16	WTB - General Excavation	CY	Paragraph 1.05.D&F; payment is by cubic yard (CY) of before and after survey of the excavation areas to the nearest whole number.
UP-17	WTB - General Fill	CY	Paragraph 1.05.D&F; payment is by cubic yard (CY) of before and after survey of the fill areas to the nearest whole number.
UP-18	WTB - Structural Fill	CY	Paragraph 1.05.D&F; payment is by cubic yard (CY) of before and after survey of the fill areas to the nearest whole number.

Item ID	Item	Unit	Measurement of Payment
UP-19	WTB - Architectural and Structural	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-20	WTB - Mechanical	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-21	WTB - Electrical and Lighting	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-22	Installation of Owner-furnished Knuckleboom Crane	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-23	WTB - Axle-Pit Scales	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.
UP-24	Z-Wall - Architectural and Structural	US	Paragraph 1.05.F; payment is by progress of this item on a unit sum (US) basis.

1.07 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by Owner.
6. Material remaining on hand after completion of Work.

1.08 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

**1.09 PARTIAL PAYMENT FOR UNDELIVERED, PROJECT-SPECIFIC
MANUFACTURED OR FABRICATED EQUIPMENT**

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 13
PROJECT COORDINATION

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational:

1. Statement of Qualification (SOQ) for professional land surveyor registered in the State of Washington.
2. Photographs:
 - a. Digital Images: Submit on disc within 5 days of being taken.
3. Organization chart (flow diagram) showing the Contractor's chain-of command with contact information to be provided at the preconstruction meeting.

1.02 GENERAL

- A. Owner's transfer station operations will be ongoing during the construction project. Refer to Article Work Sequencing/Constraints.

1.03 OWNER-FURNISHED PRODUCTS

- A. Refer to Section 01 64 00, Owner-Furnished Products.

1.04 UTILITY NOTIFICATION AND COORDINATION

- A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.

1.05 WORK SEQUENCING/CONSTRAINTS

A. General:

1. The Carothers Road Solid Waste Facility is a waste transfer facility that serves the County and its waste partners. As such, the facility needs to operate in full-time mode whereby Owner will occupy the premises and carry-on with normal business operations during the entire construction period. Contractor's normal work days and hours are specified in the Supplementary Conditions. Contractor shall schedule and conduct work activities around facility operations to enable the facilities at the landfill to operate continuously and without interruption, unless otherwise noted.

2. Coordinate with Section 01 50 00, Temporary Facilities and Controls, for other coordination items and elements of the Project such as traffic control.
3. Construct work in stages to allow Owner's continuous occupancy for uninterrupted operations at the facility. Provide traffic control and safety measures at all times for Contractor's work and Owner's operations.
4. Before any digging occurs at the Site, Contractor shall call a utility locate company to locate all utilities in the area.
5. Preserve and protect all existing facilities, including but not limited to, fencing, gates, groundwater monitoring wells, and other permanent site features.
6. Do not obstruct or interfere with site operations, traffic, or traffic on or accessing the Site. Refer to Section 01 50 00, Temporary Facilities and Controls, for Traffic Control requirements.
7. Contractor may work with the Owner to designate areas for material stockpiling and any processing areas.
8. Stormwater is not permitted to discharge into the wetland area during construction. Contractor shall stake wetland area footprint and protect the wetland area at all times. Work is not permitted in the wetland areas of the Site, unless otherwise noted or shown. Contractor shall not disturb or perform any work in these zones.
9. All temporary erosion and sediment controls must be in place before starting work, where required and applicable, in accordance with Section 01 50 00, Temporary Facilities and Controls.
10. Contractor shall coordinate at all times with Owner's special inspections and building official inspections, where applicable, along with independent quality assurance inspections that may be administered by the Engineer and/or the Owner.
11. Contractor shall establish with Owner and Engineer the chain-of-command and who can make decisions. Owner and Engineer will provide the same information to the Contractor. A list of personnel shall be prepared as part of the preconstruction meeting identifying such people.

1.06 FACILITY OPERATIONS

- A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified or arranged in advance with the Owner. Where Contractor's work will interfere with ongoing site operations, Contractor shall provide all safety systems, including, but not limited to, barriers, signage, striping, and traffic control in order to safely direct traffic and interface with site operations. All such interface must be approved in advance by the Owner.
- B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.

- C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and electrical, access, and similar items to maintain continuous operations of Owner's facility.
- D. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such authorization will be considered within 48 hours after receipt of Contractor's written request.
- E. Process or Facility Shutdown:
 - 1. Provide 5 days advance written request for approval of need to shut down a process or facility to Owner and Engineer.
 - 2. Power outages will be considered upon 48 hours written request to Owner and Engineer. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.
- F. Install and maintain bypass facilities required to keep Owner's operations on line. Sequences other than those specified will be considered upon written request to Owner and Engineer, provided they afford equivalent continuity of operations.
- G. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Engineer's advance approval of the need for and duration of such Work.
- H. Relocation of Existing Facilities:
 - 1. During construction, it is expected that minor relocations of Work will be necessary.
 - 2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
 - 3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
 - 4. Perform relocations to minimize downtime of existing facilities.
 - 5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

1.07 ADJACENT FACILITIES AND PROPERTIES

- A. Examination:
 - 1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, and affected property owners and utility

owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.

2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:

1. Record and submit documentation of observations made on examination inspections in accordance with Article Construction Photographs.
2. Upon receipt, Engineer will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.08 CONSTRUCTION PHOTOGRAPHS

A. General:

1. Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.
2. Engineer shall have right to select subject matter and vantage point from which photographs are to be taken.

B. Engineer shall have the right to select the subject matter and vantage point from which photographs are to be taken.

C. Preconstruction and Post-Construction:

1. After Effective Date of the Agreement and before Work at Site is started, and again upon issuance of Substantial Completion, take a minimum of 48 photographs of Site and property adjacent to perimeter of Site.
2. Particular emphasis shall be directed to structures both inside and outside the Site.
3. Format: Digital, minimum resolution of 756 by 504 pixels and 24-bit, millions of color.

D. Construction Progress Photos:

1. Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.

2. Weekly: Take 48 photographs using [digital, minimum resolution of 756 by 504 pixels and 24-bit, millions of color.
- E. Digital Images: Label each disk with Project and Owner's name, and month and year images were produced.

1.09 REFERENCE POINTS AND SURVEYS

- A. Owner's Responsibilities: Provide survey control points for Contractor's use as necessary to lay out Work.
- B. Location and survey control points are shown on Drawings.
- C. Contractor's Responsibilities:
1. Provide construction staking and additional survey and control required to layout the Work.
 2. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
 3. In event of discrepancy in data, request clarification before proceeding with Work.
 4. Retain professional land surveyor registered in Washington State who shall perform engineering surveying necessary for progress and as-built surveys and to provide oversight (checks) of Contractor's construction staking and layouts.
 5. Maintain complete accurate log of survey work as it progresses as a Record Document.
 6. On request of Engineer, submit documentation.
 7. Provide competent employee(s), tools, stakes, and other equipment and materials as necessary to perform the Work.
 8. Refer to Section 01 29 00, Payment Procedures, for payment (progress) and as-built survey requirements for this Project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SALVAGE OF MATERIALS

- A. No materials are scheduled for salvage.

3.02 CUTTING, FITTING, AND PATCHING

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.

- B. Obtain prior written authorization of Engineer before commencing Work to cut or otherwise alter:
 - 1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
 - 2. Weather-resistant or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Work of others.
- C. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.
- D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown on Drawings.
- E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- G. Remove specimens of installed Work for testing when requested by Engineer.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 GENERAL

- A. Engineer will schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes after each meeting to participants and parties affected by meeting decisions.

1.02 PRECONSTRUCTION CONFERENCE

- A. Contractor shall be prepared to discuss the following subjects, as a minimum:
 - 1. Required schedules.
 - 2. Status of Bonds and insurance.
 - 3. Sequencing of critical path work items.
 - 4. Progress payment procedures.
 - 5. Project changes and clarification procedures.
 - 6. Use of Site, access, office and storage areas, security and temporary facilities.
 - 7. Major product delivery and priorities.
 - 8. Contractor's safety plan and representative.
- B. Attendees will include:
 - 1. Owner's representatives.
 - 2. Contractor's office representative.
 - 3. Contractor's resident superintendent.
 - 4. Contractor's quality control representative.
 - 5. Subcontractors' representatives whom Contractor may desire or Engineer may request to attend.
 - 6. Engineer's representatives.
 - 7. Others as appropriate.

1.03 PRELIMINARY SCHEDULES REVIEW MEETING

- A. As set forth in General Conditions and Section 01 32 00, Construction Progress Documentation.

1.04 PROGRESS MEETINGS

- A. Engineer will schedule regular progress meetings at Site, conducted weekly to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.
- B. Attendees will include:
 - 1. Owner's representative(s), as appropriate.
 - 2. Contractor, Subcontractors, and Suppliers, as appropriate.
 - 3. Engineer's representative(s).
 - 4. Others as appropriate.

1.05 QUALITY CONTROL MEETINGS

- A. In accordance with Section 01 45 16.13, Contractor Quality Control.
- B. Scheduled on regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of the Work and work of other Contractors. The intent is to cover quality in each of the weekly progress meetings; however, additional meetings may be required to cover quality.
- C. Attendees will include:
 - 1. Contractor.
 - 2. Owner's representative(s), as appropriate.
 - 3. Contractor's Quality System Manager.
 - 4. Subcontractors and Suppliers, as necessary.
 - 5. Engineer's representatives.

1.06 PROCESS INSTRUMENTATION AND CONTROL SYSTEMS (PICS) COORDINATION MEETINGS

- A. Engineer will schedule meetings at Site as necessary to review specific requirements of PICS work.
- B. Attendees will include:
 - 1. Contractor.
 - 2. Owner.
 - 3. PICS Subcontractor/Installer.
 - 4. Engineer's representatives.

1.07 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene at Site prior to commencing the Work of that Section.
- B. Require attendance of entities directly affecting, or affected by, the Work of that Section.
- C. Notify Engineer 5 calendar days in advance of meeting date.
- D. Provide suggested agenda to Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.08 FACILITY STARTUP MEETINGS

- A. Schedule and attend a minimum of two facility startup meetings. The first of such meetings shall be held prior to submitting Facility Startup Plan, as specified in Section 01 91 14, Equipment Testing and Facility Startup, and shall include preliminary discussions regarding such plan.
- B. Agenda items shall include, but not be limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.
- C. Attendees will include:
 - 1. Contractor.
 - 2. Contractor's designated quality control representative.
 - 3. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
 - 4. Engineer's representatives.
 - 5. Owner's operations personnel.
 - 6. Others as required by Contract Documents or as deemed necessary by Contractor.

1.09 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by Owner and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Preliminary Progress Schedule: Submit within time specified in Paragraph 2.05 of the General Conditions.
2. Detailed Progress Schedule:
 - a. Submit initial Detailed Progress Schedule within 15 days after Effective Date of the Agreement.
 - b. Submit an Updated Progress Schedule at each update, in accordance with Article Detailed Progress Schedule.
3. Submit with Each Progress Schedule Submission:
 - a. Contractor's certification that Progress Schedule submission is actual schedule being utilized for execution of the Work.
 - b. Narrative Progress Report.
4. Prior to final payment, submit a final Updated Progress Schedule.

1.02 PRELIMINARY PROGRESS SCHEDULE

- A.** In addition to basic requirements outlined in General Conditions, show a detailed schedule, beginning with Notice to Proceed, for minimum duration of 90 days, and a summary of balance of Project through Final Completion.
- B.** Show activities including, but not limited to the following:
1. Notice to Proceed.
 2. Permits.
 3. Submittals, with review time. Contractor may use Schedule of Submittals specified in Section 01 33 00, Submittal Procedures.
 4. Early procurement activities for long lead equipment and materials.
 5. Initial Site work.
 6. Earthwork.
 7. Specified Work sequences and construction constraints.
 8. Contract Milestone and Completion Dates.
 9. Owner-furnished products delivery dates or ranges of dates.
 10. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
 11. System startup summary.
 12. Project close-out summary.
 13. Demobilization summary.

- C. Update Preliminary Progress Schedule monthly as part of progress payment process. Failure to do so may result in the Owner withholding all or part of the monthly progress payment until the Preliminary Progress Schedule is updated in a manner acceptable to Engineer.
- D. Format: In accordance with Article Progress Schedule—Bar Chart.
- E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

1.03 DETAILED PROGRESS SCHEDULE

- A. In addition to requirements of General Conditions, submit Detailed Progress Schedule beginning with Notice to Proceed and continuing through Final Completion.
- B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.
- C. When accepted by Engineer, Detailed Progress Schedule will replace Preliminary Progress Schedule and become Baseline Schedule. Subsequent revisions will be considered as Updated Progress Schedules.
- D. Format: In accordance with Article Progress Schedule—Bar Chart.
- E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

1.04 PROGRESS SCHEDULE—BAR CHART

- A. General: Comprehensive bar chart schedule, generally as outlined in Associated General Contractors of America (AGC) 580, “Construction Project Planning and Scheduling Guidelines.” If a conflict occurs between the AGC publication and this Section, this Section shall govern.
- B. Format:
 - 1. Unless otherwise approved, white paper, 11-inch by 17-inch sheet size.
 - 2. Title Block: Show name of Project and Owner, date submitted, revision or update number, and name of scheduler.
 - 3. Identify horizontally, across the top of the schedule, the time frame by year, month, and day.
 - 4. Identify each activity with a unique number and a brief description of the Work associated with that activity.
 - 5. Legend: Describe standard and special symbols used.

- C. Contents: Identify, in chronological order, those activities reasonably required to complete the Work, including as applicable, but not limited to:
1. Obtaining permits, submittals for early product procurement, and long lead time items.
 2. Mobilization and other preliminary activities.
 3. Initial Site preparatory work.
 4. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s).
 5. Subcontract Work.
 6. Major equipment design, fabrication, factory testing, and delivery dates.
 7. Anticipated delivery date for Owner-furnished products.
 8. Sitework/Earthwork.
 9. Concrete Work.
 10. Structural steel and building erection Work.
 11. Architectural features Work.
 12. Conveyance systems Work.
 13. Equipment Work.
 14. Mechanical Work.
 15. Electrical Work.
 16. Instrumentation and control Work.
 17. Interfaces with Owner-furnished equipment.
 18. Equipment and system startup and test activities.
 19. Project closeout and cleanup.
 20. Demobilization.

1.05 PROGRESS OF THE WORK

- A. Updated Progress Schedule shall reflect:
1. Progress of Work to within 5 working days prior to submission.
 2. Approved changes in Work scope and activities modified since submission.
 3. Delays in Submittals or resubmittals, deliveries, or Work.
 4. Adjusted or modified sequences of Work.
 5. Other identifiable changes.
 6. Revised projections of progress and completion.
 7. Report of changed logic.
- B. Produce detailed subschedules during Project, upon request of Owner or Engineer, to further define critical portions of the Work such as facility shutdowns.
- C. If Contractor fails to complete activity by its latest scheduled completion date and this Failure is anticipated to extend Contract Times (or Milestones), Contractor shall, within 7 days of such failure, submit a written statement as

to how Contractor intends to correct nonperformance and return to acceptable current Progress Schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

- D. Owner may order Contractor to increase plant, equipment, labor force or working hours if Contractor fails to:
 - 1. Complete a Milestone activity by its completion date.
 - 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to Owner.

1.06 NARRATIVE PROGRESS REPORT

A. Format:

- 1. Organize same as Progress Schedule.
- 2. Identify, on a cover letter, reporting period, date submitted, and name of author of report.

B. Contents:

- 1. Number of days worked over the period, work force on hand, construction equipment on hand (including utility vehicles such as pickup trucks, maintenance vehicles, stake trucks).
- 2. General progress of Work, including a listing of activities started and completed over the reporting period, mobilization/demobilization of subcontractors, and major milestones achieved.
- 3. Contractor's plan for management of Site (e.g., lay down and staging areas, construction traffic), utilization of construction equipment, buildup of trade labor, and identification of potential Contract changes.
- 4. Identification of new activities and sequences as a result of executed Contract changes.
- 5. Documentation of weather conditions over the reporting period, and any resulting impacts to the Work.
- 6. Description of actual or potential delays, including related causes, and the steps taken or anticipated to mitigate their impact.
- 7. Changes to activity logic.
- 8. Changes to the critical path.
- 9. Identification of, and accompanying reason for, any activities added or deleted since the last report.
- 10. Steps taken to recover the schedule from Contractor-caused delays.

1.07 SCHEDULE ACCEPTANCE

A. Engineer's acceptance will demonstrate agreement that:

1. Proposed schedule is accepted with respect to:
 - a. Contract Times, including Final Completion and all intermediate Milestones are within the specified times.
 - b. Specified Work sequences and constraints are shown as specified.
 - c. Specified Owner-furnished Equipment or Material arrival dates, or range of dates, are included.
 - d. Access restrictions are accurately reflected.
 - e. Startup and testing times are as specified.
 - f. Submittal review times are as specified.
 - g. Startup testing duration is as specified and timing is acceptable.
2. In all other respects, Engineer's acceptance of Contractor's schedule indicates that, in Engineer's judgment, schedule represents reasonable plan for constructing Project in accordance with the Contract Documents. Engineer's review will not make any change in Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to Engineer's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.

B. Unacceptable Preliminary Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process, during which time Contractor shall update schedule on a monthly basis to reflect actual progress and occurrences to date.

C. Unacceptable Detailed Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process.

D. Narrative Report: All changes to activity duration and sequences, including addition or deletion of activities subsequent to Engineer's acceptance of Baseline Progress Schedule, shall be delineated in Narrative Report current with proposed Updated Progress Schedule.

1.08 ADJUSTMENT OF CONTRACT TIMES

- A. Reference General Conditions and Section 01 26 00, Contract Modification Procedures.
- B. Evaluation and reconciliation of Adjustments of Contract Times shall be based on the Updated Progress Schedule at the time of proposed adjustment or claimed delay.
- C. Float:
 - 1. Float time is a Project resource available to both parties to meet contract Milestones and Contract Times.
 - 2. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of Owner and Contractor.
 - 3. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond contract completion date.
- D. Claims Based on Contract Times:
 - 1. Where Engineer has not yet rendered formal decision on Contractor's Claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in Progress Schedule, Contractor shall reflect an interim adjustment in the Progress Schedule as acceptable to Engineer.
 - 2. It is understood and agreed that such interim acceptance will not be binding on either Contractor or Owner, and will be made only for the purpose of continuing to schedule Work until such time as formal decision has been rendered as to an adjustment, if any, of the Contract Times.
 - 3. Contractor shall revise Progress Schedule prepared thereafter in accordance with Engineer's formal decision.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by Contractor that requires Engineer's approval.
- B. Informational Submittal: Information submitted by Contractor that requires Engineer's review and determination that submitted information is in accordance with the Conditions of the Contract.

1.02 PROCEDURES

- A. Direct submittals to Engineer at the following, unless determined otherwise.

CH2M HILL
Attn: Travis Pyle
322 East Front Street, Suite 200
Boise, ID 83702
E-mail: Travis.Pyle@ch2m.com

- B. Electronic Submittals: All submittals shall be provided in electronic format (except samples).
 - 1. Each submittal shall be an electronic file in Adobe Acrobat Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement.
 - 2. Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to major sections of the document.
 - 3. PDF files shall be set to open "Bookmarks and Page" view.
 - 4. Add general information to each PDF file, including title, subject, author, and keywords.
 - 5. PDF files shall be set up to print legibly at 8.5-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
 - 6. Submit new electronic files for each resubmittal.
 - 7. Include a copy of the Transmittal of Contractor's Submittal form, located at end of Section, with each electronic file.
 - 8. Engineer will reject submittal that is not electronically submitted, unless specifically accepted.

9. Provide Engineer with authorization to reproduce and distribute each file as many times as necessary for Project documentation.
10. Further procedures for handling electronic submittals will be discussed at the preconstruction conference.

C. Transmittal of Submittal:

1. Contractor shall:
 - a. Review each submittal and check for compliance with Contract Documents.
 - b. Stamp each submittal with uniform approval stamp before submitting to Engineer.
 - 1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying submittal has been reviewed, checked, and approved for compliance with Contract Documents.
 - 2) Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
2. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form attached at end of this Section.
3. Identify each submittal with the following:
 - a. Numbering and Tracking System:
 - 1) Sequentially number each submittal.
 - 2) Resubmission of submittal shall have original number with sequential alphabetic suffix.
 - b. Specification section and paragraph to which submittal applies.
 - c. Project title and Engineer's project number.
 - d. Date of transmittal.
 - e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
4. Identify and describe each deviation or variation from Contract Documents.

D. Format:

1. Do not base Shop Drawings on reproductions of Contract Documents.
2. Package submittal information by individual specification section. Do not combine different specification sections together in submittal package, unless otherwise directed in Specifications.
3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
4. Index with labeled tab dividers in orderly manner.

- E. Timeliness: Schedule and submit in accordance Schedule of Submittals, and requirements of individual specification sections.
- F. Processing Time:
 - 1. Time for review shall commence on Engineer's receipt of submittal.
 - 2. Engineer will act upon Contractor's submittal and transmit response to Contractor not later than 10 days after receipt, unless otherwise specified.
 - 3. Resubmittals will be subject to same review time.
 - 4. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals.
- G. Resubmittals: Clearly identify each correction or change made.
- H. Incomplete Submittals:
 - 1. Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
 - 2. When any of the following are missing, submittal will be deemed incomplete:
 - a. Contractor's review stamp; completed and signed.
 - b. Transmittal of Contractor's Submittal; completed and signed.
 - c. Insufficient number of copies.
- I. Submittals not required by Contract Documents:
 - 1. Will not be reviewed and will be returned stamped "Not Subject to Review."
 - 2. Engineer will keep one copy and return submittal to Contractor.

1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual specification sections.
- B. Shop Drawings:
 - 1. Identify and Indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on Drawings.

- c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
 - 2. Manufacturer's standard schematic drawings and diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
 - 3. Product Data: Provide as specified in individual specifications.
 - a. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit required supporting data and drawings for review and acceptance by Engineer. Documentation of review and approval provided on Engineer's comment form, along with completed submittal.

C. Samples:

- 1. Copies: Two, unless otherwise specified in individual specifications.
- 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
 - a. Manufacturer name.
 - b. Model number.
 - c. Material.
 - d. Sample source.
- 3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
- 4. Full-size Samples:
 - a. Size as indicated in individual specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.

D. Action Submittal Dispositions: Engineer will review, comment, stamp, and distribute as noted:

- 1. Approved:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal.
 - b. Distribution: Electronic.
- 2. Approved as Noted:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - b. Distribution: Electronic.

3. Partial Approval, Resubmit as Noted:
 - a. Make corrections or obtain missing portions, and resubmit.
 - b. Except for portions indicated, Contractor may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - c. Distribution: Electronic.
4. Revise and Resubmit:
 - a. Contractor may not incorporate product(s) or implement Work covered by submittal.
 - b. Distribution: Electronic.

1.04 INFORMATIONAL SUBMITTALS

A. General:

1. Refer to individual specification sections for specific submittal requirements.
2. Engineer will review each submittal. If submittal meets conditions of the Contract, Engineer will forward copy to appropriate parties. If Engineer determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Engineer will retain one copy and return remaining copy with review comments to Contractor, and require that submittal be corrected and resubmitted.

B. Certificates:

1. General:
 - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
2. Welding: In accordance with individual specification sections.
3. Installer: Prepare written statements on manufacturer's letterhead certifying installer complies with requirements as specified in individual specification section.
4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual specification sections.
6. Manufacturer's Certificate of Compliance: In accordance with Section 01 43 33, Manufacturers' Field Services.
7. Manufacturer's Certificate of Proper Installation: In accordance with Section 01 43 33, Manufacturers' Field Services.

- C. Construction Photographs: In accordance with Section 01 31 13, Project Coordination, and as may otherwise be required in Contract Documents.
- D. Closeout Submittals: In accordance with Section 01 77 00, Closeout Procedures.
- E. Contractor-Design Data (Related to Temporary Construction):
 - 1. Written and graphic information.
 - 2. List of assumptions.
 - 3. List of performance and design criteria.
 - 4. Summary of loads or load diagram, if applicable.
 - 5. Calculations.
 - 6. List of applicable codes and regulations.
 - 7. Name and version of software.
 - 8. Information requested in individual specification section.
- F. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual specification section.
- G. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- H. Payment:
 - 1. Application for Payment: In accordance with Section 01 29 00, Payment Procedures.
 - 2. Schedule of Values: In accordance with Section 01 29 00, Payment Procedures.
 - 3. Schedule of Estimated Progress Payments: In accordance with Section 01 29 00, Payment Procedures.
- I. Quality Control Documentation: As required in Section 01 45 16.13, Contractor Quality Control.
- J. Schedules:
 - 1. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 00, Construction Progress Documentation.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.
 - 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.

- 3) Estimated date of submission to Engineer, including reviewing and processing time.
 - b. On a monthly basis, submit updated Schedule of Submittals to Engineer if changes have occurred or resubmittals are required.
 2. Progress Schedules: In accordance with Section 01 32 00, Construction Progress Documentation.
- K. Special Guarantee: Supplier's written guarantee as required in individual specification sections.
- L. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals, as required by the individual specifications.
- M. Submittals Required by Laws, Regulations, and Governing Agencies:
1. Promptly submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 2. Transmit to Engineer for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.
- N. Test, Evaluation, and Inspection Reports:
1. General: Shall contain signature of person responsible for test or report.
 2. Factory:
 - a. Identification of product and specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Engineer.
 - f. Other items as identified in individual specification sections.
 3. Field:
 - a. As a minimum, include the following:
 - 1) Project title and number.
 - 2) Date and time.
 - 3) Record of temperature and weather conditions.
 - 4) Identification of product and specification section.

- 5) Type and location of test, Sample, or inspection, including referenced standard or code.
- 6) Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
- 7) If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
- 8) Provide interpretation of test results, when requested by Engineer.
- 9) Other items as identified in individual specification sections.

O. Testing and Startup Data: In accordance with Section 01 91 14, Equipment Testing and Facility Startup.

P. Training Data: In accordance with Section 01 43 33, Manufacturers' Field Services.

1.05 SUPPLEMENT

A. The supplement listed below, following "End of Section," is part of this Specification.

1. Transmittal of Contractor's Submittal.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

 CH2MHILL	TRANSMITTAL OF CONTRACTOR'S SUBMITTAL (ATTACH TO EACH SUBMITTAL)	DATE: _____
TO: _____ _____ _____ _____ _____ FROM: _____ Contractor _____ _____ _____	Submittal No.: _____ ☐ New Submittal ☐ Resubmittal Project: _____ Project No.: _____ Specification Section No.: _____ (Cover only one section with each transmittal) Schedule Date of Submittal: _____ _____	
SUBMITTAL TYPE:	☐ Action	☐ Informational
☐ Shop Drawing	☐ Sample	☐ QA/QC

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. and Para. No.	Drawing or Brochure Number	Contains Variation to Contract	
				No	Yes

Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
 Contractor (Authorized Signature)

SECTION 01 42 13
ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

- A. Reference to standards and specifications of technical societies and reporting and resolving discrepancies associated therewith shall be as provided in Article 3 of the General Conditions, and as may otherwise be required herein and in the individual specification sections.
- B. Work specified by reference to published standard or specification of government agency, technical association, trade association, professional society or institute, testing agency, or other organization shall meet requirements or surpass minimum standards of quality for materials and workmanship established by designated standard or specification.
- C. Where so specified, products or workmanship shall also meet or exceed additional prescriptive or performance requirements included within Contract Documents to establish a higher or more stringent standard of quality than required by referenced standard.
- D. Where two or more standards are specified to establish quality, product and workmanship shall meet or exceed requirements of most stringent.
- E. Where both a standard and a brand name are specified for a product in Contract Documents, proprietary product named shall meet or exceed requirements of specified reference standard.
- F. Copies of standards and specifications of technical societies:
 - 1. Copies of applicable referenced standards have not been bound in these Contract Documents.
 - 2. Where copies of standards are needed by Contractor, obtain a copy or copies directly from publication source and maintain in an orderly manner at the Site as Work Site records, available to Contractor's personnel, Subcontractors, Owner, and Engineer.

1.02 ABBREVIATIONS

A. Abbreviations for trade organizations and government agencies: Following is a list of construction industry organizations and government agencies to which references may be made in the Contract Documents, with abbreviations used.

1.	AA	Aluminum Association
2.	AABC	Associated Air Balance Council
3.	AAMA	American Architectural Manufacturers Association
4.	AASHTO	American Association of State Highway and Transportation Officials
5.	ABMA	American Bearing Manufacturers' Association
6.	ACI	American Concrete Institute
7.	AEIC	Association of Edison Illuminating Companies
8.	AGA	American Gas Association
9.	AGMA	American Gear Manufacturers' Association
10.	AI	Asphalt Institute
11.	AISC	American Institute of Steel Construction
12.	AISI	American Iron and Steel Institute
13.	AITC	American Institute of Timber Construction
14.	ALS	American Lumber Standards
15.	AMCA	Air Movement and Control Association
16.	ANSI	American National Standards Institute
17.	APA	APA – The Engineered Wood Association
18.	API	American Petroleum Institute
19.	APWA	American Public Works Association
20.	AHRI	Air-Conditioning, Heating, and Refrigeration Institute
21.	ASA	Acoustical Society of America
22.	ASABE	American Society of Agricultural and Biological Engineers
23.	ASCE	American Society of Civil Engineers
24.	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
25.	ASME	American Society of Mechanical Engineers
26.	ASNT	American Society for Nondestructive Testing
27.	ASSE	American Society of Sanitary Engineering
28.	ASTM	ASTM International
29.	AWI	Architectural Woodwork Institute
30.	AWPA	American Wood Preservers' Association
31.	AWPI	American Wood Preservers' Institute
32.	AWS	American Welding Society
33.	AWWA	American Water Works Association

34.	BHMA	Builders Hardware Manufacturers' Association
35.	CBM	Certified Ballast Manufacturer
36.	CDA	Copper Development Association
37.	CGA	Compressed Gas Association
38.	CISPI	Cast Iron Soil Pipe Institute
39.	CMAA	Crane Manufacturers' Association of America
40.	CRSI	Concrete Reinforcing Steel Institute
41.	CS	Commercial Standard
42.	CSA	Canadian Standards Association
43.	CSI	Construction Specifications Institute
44.	DIN	Deutsches Institut für Normung e.V.
45.	DIPRA	Ductile Iron Pipe Research Association
46.	EIA	Electronic Industries Alliance
47.	EJCDC	Engineers Joint Contract Documents' Committee
48.	ETL	Electrical Test Laboratories
49.	FAA	Federal Aviation Administration
50.	FCC	Federal Communications Commission
51.	FDA	Food and Drug Administration
52.	FEMA	Federal Emergency Management Agency
53.	FIPS	Federal Information Processing Standards
54.	FM	FM Global
55.	Fed. Spec.	Federal Specifications (FAA Specifications)
56.	FS	Federal Specifications and Standards (Technical Specifications)
57.	GA	Gypsum Association
58.	GANA	Glass Association of North America
59.	HI	Hydraulic Institute
60.	HMI	Hoist Manufacturers' Institute
61.	IBC	International Building Code
62.	ICBO	International Conference of Building Officials
63.	ICC	International Code Council
64.	ICEA	Insulated Cable Engineers' Association
65.	IFC	International Fire Code
66.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
67.	IESNA	Illuminating Engineering Society of North America
68.	IFI	Industrial Fasteners Institute
69.	IGMA	Insulating Glass Manufacturer's Alliance
70.	IMC	International Mechanical Code
71.	INDA	Association of the Nonwoven Fabrics Industry
72.	IPC	International Plumbing Code
73.	ISA	International Society of Automation
74.	ISO	International Organization for Standardization

75.	ITL	Independent Testing Laboratory
76.	JIC	Joint Industry Conferences of Hydraulic Manufacturers
77.	MIA	Marble Institute of America
78.	MIL	Military Specifications
79.	MMA	Monorail Manufacturers' Association
80.	MSS	Manufacturer's Standardization Society
81.	NAAMM	National Association of Architectural Metal Manufacturers
82.	NACE	NACE International
83.	NBGQA	National Building Granite Quarries Association
84.	NEBB	National Environmental Balancing Bureau
85.	NEC	National Electrical Code
86.	NECA	National Electrical Contractor's Association
87.	NEMA	National Electrical Manufacturers' Association
88.	NESC	National Electrical Safety Code
89.	NETA	InterNational Electrical Testing Association
90.	NFPA	National Fire Protection Association
91.	NHLA	National Hardwood Lumber Association
92.	NICET	National Institute for Certification in Engineering Technologies
93.	NIST	National Institute of Standards and Technology
94.	NRCA	National Roofing Contractors Association
95.	NRTL	Nationally Recognized Testing Laboratories
96.	NSF	NSF International
97.	NSPE	National Society of Professional Engineers
98.	NTMA	National Terrazzo and Mosaic Association
99.	NWWDA	National Wood Window and Door Association
100.	OSHA	Occupational Safety and Health Act (both Federal and State)
101.	PCI	Precast/Prestressed Concrete Institute
102.	PEI	Porcelain Enamel Institute
103.	PPI	Plastic Pipe Institute
104.	PS	Product Standards Section-U.S. Department of Commerce
105.	RMA	Rubber Manufacturers' Association
106.	RUS	Rural Utilities Service
107.	SAE	SAE International
108.	SDI	Steel Deck Institute
109.	SDI	Steel Door Institute
110.	SJI	Steel Joist Institute
111.	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
112.	SPI	Society of the Plastics Industry
113.	SSPC	The Society for Protective Coatings

114. STI/SPFA	Steel Tank Institute/Steel Plate Fabricators Association
115. SWI	Steel Window Institute
116. TEMA	Tubular Exchanger Manufacturers' Association
117. TCA	Tile Council of North America
118. TIA	Telecommunications Industry Association
119. UBC	Uniform Building Code
120. UFC	Uniform Fire Code
121. UL	Underwriters Laboratories Inc.
122. UMC	Uniform Mechanical Code
123. USBR	U.S. Bureau of Reclamation
124. WCLIB	West Coast Lumber Inspection Bureau
125. WI	Wood Institute
126. WWPA	Western Wood Products Association

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 43 33
MANUFACTURERS' FIELD SERVICES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.02 SUBMITTALS

- A. Action Submittals:

1. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.
2. Training Session Recordings: Furnish Owner with two complete sets of recordings fully indexed and cataloged with printed label stating session and date recorded.

1.03 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual specification section.
- B. Representative subject to acceptance by Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish manufacturers' services, when required by an individual specification section, to meet the requirements of this Section.
- B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time required to perform specified services shall be considered incidental.

- C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.
- D. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.
- E. Only those days of service approved by Engineer will be credited to fulfill specified minimum services.
- F. When specified in individual specification sections, manufacturer's onsite services shall include:
 - 1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
 - 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 - 3. Providing, on a daily basis, copies of manufacturers' representatives field notes and data to Engineer.
 - 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Engineer.
 - 5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.
 - 6. Assistance during functional and performance testing, and facility startup and evaluation.
 - 7. Training of Owner's personnel in the operation and maintenance of respective product as required.

3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When so specified, a Manufacturer's Certificate of Compliance, a copy of which is attached to this Section, shall be completed in full, signed by entity supplying the product, material, or service, and submitted prior to shipment of product or material or execution of the services.
- B. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Such form shall certify proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Engineer.

3.03 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this Section, shall be completed and signed by equipment manufacturer's representative.
- B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

3.04 TRAINING

A. General:

- 1. Furnish manufacturers' representatives for hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
- 2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 01 78 23, Operation and Maintenance Data.
- 3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
- 4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule:

- 1. List specified equipment and systems that require training services and show:
 - a. Respective manufacturer.
 - b. Estimated dates for installation completion.
 - c. Estimated training dates.
- 2. Allow for multiple sessions when several shifts are involved.
- 3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
- 4. Coordinate with Section 01 32 00, Construction Progress Documentation, and Section 01 91 14, Equipment Testing and Facility Startup.

- C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
1. Title and objectives.
 2. Recommended attendees (such as, managers, engineers, operators, maintenance).
 3. Course description, outline of course content, and estimated class duration.
 4. Format (such as, lecture, self-study, demonstration, hands-on).
 5. Instruction materials and equipment requirements.
 6. Resumes of instructors providing training.
- D. Prestartup Training:
1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01 78 23, Operation and Maintenance Data.
 2. Complete at least 14 days prior to beginning of facility startup.
- E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.
- F. Recording of Training Sessions:
1. Furnish video recording of all instruction sessions, including manufacturers' representatives' hands-on equipment instruction.
 2. Use DVD format suitable for playback on standard equipment available commercially in the United States. Blu-ray® DVD format is not acceptable without Engineer's prior approval.
 3. DVD may contain multiple training sessions. If multiple training sessions included on a DVD, provide with on-screen menu for playback selection.

3.05 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are part of this Specification.
1. Manufacturer's Certificate of Compliance.
 2. Manufacturer's Certificate of Proper Installation.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF COMPLIANCE

OWNER: _____ PRODUCT, MATERIAL, OR SERVICE
PROJECT NAME: _____ SUBMITTED: _____
PROJECT NO: _____

Comments: _____

I hereby certify that the above-referenced product, material, or service called for by the Contract for the named Project will be furnished in accordance with all applicable requirements. I further certify that the product, material, or service are of the quality specified and conform in all respects with the Contract requirements, and are in the quantity shown.

Date of Execution: _____, 20____

Manufacturer: _____

Manufacturer's Authorized Representative (*print*): _____

(Authorized Signature)

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER _____ EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- ☐ Installed in accordance with Manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ Functional tests.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate their equipment and (iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20____

Manufacturer: _____

By Manufacturer's Authorized Representative: _____

(Authorized Signature)

SECTION 01 45 16.13
CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. ASTM International (ASTM):
 - a. D3740, Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - b. E329, Use in the Evaluation of Testing and Inspection Agencies as Used in Construction.

1.02 DEFINITIONS

A. Contractor Quality Control (CQC): The means by which Contractor ensures that the construction, to include that performed by subcontractors and suppliers, complies with the requirements of the Contract. CQC shall be well coordinated and orchestrated with the Owner's special inspections and building official inspections, where applicable.

1.03 SUBMITTALS

A. Action Submittals:

1. CQC Plan: Submit, not later than 10 calendar days after receipt of Notice to Proceed.
2. CQC Report: Submit, weekly.
3. Testing Laboratory/Agency's Statement of Qualification (SOQ) for CQC testing for the Project.

1.04 OWNER'S QUALITY ASSURANCE

A. All Work is subject to Owner's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.

B. Owner's quality assurance inspections and tests are for the sole benefit of Owner and do not:

1. Relieve Contractor of responsibility for providing adequate quality control measures;
2. Relieve Contractor of responsibility for damage to or loss of the material before acceptance;

- 3. Constitute or imply acceptance; or
 - 4. Affect the continuing rights of Owner after acceptance of the completed Work.
- C. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.
- D. Promptly furnish all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by Engineer.
- E. Owner may charge Contractor for any additional cost of inspection or test when Work is not ready at the time specified by Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary. Quality assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain an adequate inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents.
- B. Maintain complete inspection records and make them available at all times to Owner and Engineer.
- C. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, fabricators, suppliers and purchasing agents, and shall be keyed to the proposed construction sequence.

3.02 COORDINATION MEETING

- A. After the Preconstruction Conference, but before start of construction, and prior to acceptance of the CQC Plan, schedule a meeting with Engineer and Owner to discuss the quality control system.
- B. Develop a mutual understanding of the system details, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite Work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance.

- C. There may be occasions when subsequent conferences may be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures that may require corrective action by Contractor.

3.03 QUALITY CONTROL ORGANIZATION

A. CQC System Manager:

1. Designate an individual within Contractor's organization who will be responsible for overall management of CQC and have the authority to act in CQC matters for the Contractor.
2. CQC System Manager may perform other duties on the Project.
3. CQC System Manager shall be an experienced construction person, with a minimum of 3 years construction experience on similar type Work.
4. CQC System Manager shall report to the Contractor's project manager or someone higher in the organization. Project manager in this context shall mean the individual with responsibility for the overall quality and production management of the Project.
5. CQC System Manager shall be onsite during construction; periods of absence may not exceed 2 weeks at any one time.
6. Identify an alternate for CQC System Manager to serve with full authority during the System Manager's absence. The requirements for the alternate will be the same as for designated CQC System Manager.

B. CQC Staff:

1. Designate a CQC staff, available at the Site at all times during progress, with complete authority to take any action necessary to ensure compliance with the Contract. CQC staff members shall be subject to acceptance by Engineer.
2. CQC staff shall take direction from CQC System Manager in matters pertaining to QC.
3. CQC staff must be of sufficient size to ensure adequate QC coverage of Work phases, work shifts, and work crews involved in the construction. These personnel may perform other duties, but must be fully qualified by experience and technical training to perform their assigned QC responsibilities and must be allowed sufficient time to carry out these responsibilities.
4. The actual strength of the CQC staff may vary during any specific Work period to cover the needs of the Project. Add additional staff when necessary for a proper CQC organization.

- C. Organizational Changes: Obtain Engineer's acceptance before replacing any member of the CQC staff. Requests for changes shall include name, qualifications, duties, and responsibilities of the proposed replacement.

3.04 CONTRACTOR QUALITY CONTROL PHASING

A. CQC shall include at least three phases of control to be conducted by CQC System Manager for all definable features of Work, as follows:

1. Preparatory Phase:
 - a. Notify Owner at least 48 hours in advance of beginning any of the required action of the preparatory phase.
 - b. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The CQC System Manager shall instruct applicable CQC staff as to the acceptable level of workmanship required in order to meet Contract requirements.
 - c. Document the results of the preparatory phase meeting by separate minutes prepared by the CQC System Manager and attached to the QC report.
 - d. Perform prior to beginning Work on each definable feature of Work:
 - 1) Review applicable Contract Specifications.
 - 2) Review applicable Contract Drawings.
 - 3) Verify that all materials and/or equipment have been tested, submitted, and approved.
 - 4) Verify that provisions have been made to provide required control inspection and testing.
 - 5) Examine the Work area to verify that all required preliminary Work has been completed and is in compliance with the Contract.
 - 6) Perform a physical examination of required materials, equipment, and sample Work to verify that they are on hand, conform to approved Shop Drawing or submitted data, and are properly stored.
 - 7) Review the appropriate activity hazard analysis to verify safety requirements are met.
 - 8) Review procedures for constructing the Work, including repetitive deficiencies.
 - 9) Document construction tolerances and workmanship standards for that phase of the Work.
 - 10) Check to verify that the plan for the Work to be performed, if so required, has been accepted by Engineer.
2. Initial Phase:
 - a. Accomplish at the beginning of a definable feature of Work:
 - 1) Notify Owner at least 48 hours in advance of beginning the initial phase.

- 2) Perform prior to beginning Work on each definable feature of Work:
 - a) Review minutes of the preparatory meeting.
 - b) Check preliminary Work to verify compliance with Contract requirements.
 - c) Verify required control inspection and testing.
 - d) Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Comparison with sample panels is appropriate.
 - e) Resolve all differences.
 - f) Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
 - 3) Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
 - 4) The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
3. Follow-up Phase:
- a. Perform daily checks to verify continuing compliance with Contract requirements, including control testing, until completion of the particular feature of Work.
 - b. Daily checks shall be made a matter of record in the CQC documentation and shall document specific results of inspections for all features of Work for the day or shift.
 - c. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of Work that will be affected by the deficient Work. Constructing upon or concealing nonconforming Work will not be allowed.
4. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be conducted on the same definable features of Work as determined by Owner if the quality of ongoing Work is unacceptable; or if there are changes in the applicable QC staff or in the onsite production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.05 CONTRACTOR QUALITY CONTROL PLAN

A. General:

1. Plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used.

2. An interim plan for the first 30 days of operation will be considered.
3. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of Work to be started.
4. Work outside of the features of Work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of Work to be started.

B. Content:

1. Plan shall cover the intended CQC organization for the entire Contract and shall include the following, as a minimum:
 - a. Organization: Description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three-phase control system (see Paragraph Contractor Quality Control Phasing) for all aspects of the Work specified.
 - b. CQC Staff: The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QC function.
 - c. Letters of Authority: A copy of a letter to the CQC System Manager signed by an authorized official of the firm, describing the responsibilities and delegating sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop Work which is not in compliance with the Contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to Owner.
 - d. Submittals: Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers and purchasing agents.
 - e. Testing: Control, verification and acceptance testing procedures for each specific test to include the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required.
 - f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.
 - g. Procedures for tracking deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
 - h. Reporting procedures, including proposed reporting formats; include a copy of the CQC report form.

- C. Acceptance of Plans: Acceptance of the Contractor's basic and addendum CQC plans is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. Owner reserves the right to require Contractor to make changes in the CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes: After acceptance of the CQC plan, Contractor shall notify Engineer, in writing, a minimum of 7 calendar days prior to any proposed change. Proposed changes are subject to acceptance by Engineer.

3.06 CONTRACTOR QUALITY CONTROL REPORT

- A. As a minimum, prepare a CQC report for every 7 calendar days. Account for all days throughout the life of the Contract. Reports shall be signed and dated by CQC System Manager. Include copies of test reports and copies of reports prepared by QC staff.
- B. Maintain current records of quality control operations, activities, and tests performed, including the Work of subcontractors and suppliers.
- C. Records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
 - 1. Contractor/subcontractor and their areas of responsibility.
 - 2. Operating plant/equipment with hours worked, idle, or down for repair.
 - 3. Work performed today, giving location, description, and by whom. When a network schedule is used, identify each phase of Work performed each day by activity number.
 - 4. Test and/or control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
 - 5. Material received with statement as to its acceptability and storage.
 - 6. Identify submittals reviewed, with Contract reference, by whom, and action taken.
 - 7. Offsite surveillance activities, including actions taken.
 - 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
 - 9. List instructions given/received and conflicts in Drawings and/or Specifications.
 - 10. Contractor's verification statement.
 - 11. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.

12. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in file work and workmanship comply with the Contract.

3.07 SUBMITTAL QUALITY CONTROL

- A. Submittals shall be as specified in Section 01 33 00, Submittal Procedures. The CQC organization shall be responsible for certifying that all submittals are in compliance with the Contract requirements. Owner will furnish copies of test report forms upon request by Contractor. Contractor may use other forms as approved.

3.08 TESTING FOR CONTRACTOR QUALITY CONTROL

A. Testing Procedure:

1. Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to Contract requirements. Procure services of a licensed testing laboratory. Perform the following activities and record the following data:
 - a. Verify testing procedures comply with contract requirements.
 - b. Verify facilities and testing equipment are available and comply with testing standards.
 - c. Check test instrument calibration data against certified standards.
 - d. Verify recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
 - e. Documentation:
 - 1) Record results of all tests taken, both passing and failing, on the CQC report for the date taken.
 - 2) Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test.
 - 3) Actual test reports may be submitted later, if approved by Engineer, with a reference to the test number and date taken.
 - 4) Provide directly to Engineer an information copy of tests performed by an offsite or commercial test facility. Test results shall be signed by an engineer registered in the state where the tests are performed.
 - 5) Failure to submit timely test reports, as stated, may result in nonpayment for related Work performed and disapproval of the test facility for this Contract.

- B. Testing Laboratories: Laboratory facilities, including personnel and equipment, utilized for testing soils, concrete, asphalt and steel shall meet criteria detailed in ASTM D3740 and ASTM E329, and be accredited by the

American Association of Laboratory Accreditation (AALA), National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO), or other approved national accreditation authority. Personnel performing concrete testing shall be certified by the American Concrete Institute (ACI).

3.09 COMPLETION INSPECTION

- A. CQC System Manager shall conduct an inspection of the Work at the completion of all Work or any milestone established by a completion time stated in the Contract.
- B. Punchlist:
 - 1. CQC System Manager shall develop a punchlist of items which do not conform to the Contract requirements.
 - 2. Include punchlist in the CQC report, indicating the estimated date by which the deficiencies will be corrected.
 - 3. CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Owner.
 - 4. These inspections and any deficiency corrections required will be accomplished within the time stated for completion of the entire Work or any particular increment thereof if the Project is divided into increments by separate completion dates.

END OF SECTION

SECTION 01 45 33
SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2009 International Building Code and is in addition to and supplements requirements included in Statement of Special Inspections (Plan) shown on Drawings. Special inspections will be done by a third-party firm hired directly by the Owner. Contractor's responsibility is to coordinate all applicable work with the Owner's special inspections (and building officials), where required.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. International Code Council (ICC):
 - a. 2009 International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.
 2. American Society of Civil Engineers (ASCE): 7-05, Minimum Design Loads for Buildings and Other Structures.

1.03 DEFINITIONS

- A. Agencies and Personnel:
1. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 2. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the Project is to be constructed.
 3. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of the building official for inspection of a particular type of construction or operation requiring Special Inspection.
- B. Special Inspection:
1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections

requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.

2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work is being performed.
3. Special Inspection, Periodic: Part-time or intermittent observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work has been or is being performed, and at the completion of the Work.

C. Structural Systems and Components:

1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of a diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to the plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
5. Wind-Force-Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.

D. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to the structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to the structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical Component Supports: Structural members or assemblies which transmit loads and forces from mechanical equipment to the structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

E. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections (Plan) provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Statement of Special Inspections (Plan): Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

1.04 SUBMITTALS

A. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by each contractor responsible for construction of a main seismic-force-resisting system, listed in Statement of Special Inspections (Plan). Refer to Article Supplements located at end of Section.

1.05 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1707: See Drawings for basic lateral load resisting systems for each structure and other designated seismic systems.
2. Wind-force-resisting systems designated under IBC Section 1705: None required.

B. Statement of Special Inspections (Plan):

1. As included in Drawings and in support of the building permit application, the Project specific plan was prepared by the registered design professional in responsible charge. The following identifies elements of the inspection, observation, and testing program to be followed in construction of the Work:
 - a. Designated seismic systems and main seismic-force-resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.
 - b. Special Inspection and testing required by IBC Section 1704 and Section 1708, and other applicable sections and referenced standards therein.
 - c. Type and frequency of Special Inspection required.
 - d. Type and frequency of testing required.
 - e. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
 - f. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
 - g. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.

C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency. Owner will secure and pay for the services of the agency to perform Special Inspection and associated testing.

D. Owner's plan for code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections (Plan) on Drawings and further provided in this Section, is for the sole benefit of Owner and does not:

1. Relieve Contractor of responsibility for providing adequate quality control measures.
2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
3. Constitute or imply acceptance.
4. Affect continuing rights of Owner after acceptance of completed Work.

E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.

- F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor, and Special Inspectors and Professional Observer are on Site but not able to provide contracted services.
- G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required due to rejection of materials of in place Work that cannot be made compliant to Contract Document without additional Site visits or testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Provide access to shop or Site for Special Inspection and Testing and Professional Observation.
- B. Notify Engineer in advance of required Special Inspection and Professional Observation no later than 48 hours prior to date of Special Inspection and Professional Observation.
- C. Materials and systems, inclusive, shall be inspected during placement where Continuous Special Inspection is required.
- D. Materials and systems shall be inspected during or at completion of their placement where Periodic Special Inspection is allowed.
 - 1. Periodic Special Inspection shall be performed so that Work inspected after, but not during, its placement can be corrected prior to other related Work proceeding and covering inspected Work.
 - 2. Periodic Special Inspection does not allow sampling of a portion of the Work. All Work shall be inspected.

3.02 SUPPLEMENT

- A. The supplement listed below, following “End of Section,” is a part of this Specification:
 - 1. Contractor’s Statement of Responsibility.

END OF SECTION

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

(Project)

(Name of Contracting Company)

(Business Address)

(_____)_____
(Telephone)

(_____)_____
(Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing and Professional Observation and component certification requirements contained in Contract Documents for this Project for seismic-force-resisting systems as listed in Statement of Special Inspections (Plan) on Drawings, and that:

1. I, (We) are responsible for implementation of the Statement of Special Inspections (Plan) for the construction of the following systems:

Facility	Lateral Force-Resisting System
1–Waste Transfer Building 2–Two-Wall Structure	Ordinary Steel Moment Frames and Ordinary Steel Concentrically Braced Frames

2. Control of this Work will be exercised to obtain conformance with the Contract Documents approved by the building official.
3. Procedures to be used for exercising control of the Work, the method and frequency of reporting, and distribution of reports required under the Statement of Special Inspections (Plan) for this Project are attached.
4. I, (We) will provide 48-hour notification to Engineer and approved agency as required for structural tests and Special Inspection for this Project.

5. The following person is hereby identified as exercising control over the requirements of this Section for the Work designated above:

Name: _____

Qualifications: _____

(Print name and official title of person signing this form)

Signed by: _____

Date: _____

Project Name: _____

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Nursery and Landscape Association (ANLA): American Standards for Nursery Stock.
2. Federal Emergency Management Agency (FEMA).
3. National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
4. Telecommunications Industry Association (TIA): 568-C, Commercial Building Telecommunications Cabling Standard.
5. U.S. Department of Agriculture (USDA): Urban Hydrology for Small Watersheds.
6. U.S. Weather Bureau: Rainfall-Frequency Atlas of the U.S. for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years.

1.02 SUBMITTALS

A. Action Submittals:

1. Temporary Construction Plan with the following information included:
 - a. Electric power supply and distribution.
 - b. Water supply and distribution (potable and construction water).
 - c. Dewatering systems.
 - d. Sanitary.
2. Temporary Construction Plan with the following information included:
 - a. Access Roads: Routes, cross-sections, and drainage facilities.
 - b. Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.
 - c. Fencing and protective barrier locations and details.
 - d. Traffic Control Plan: As specified herein, and proposed revisions thereto.
 - e. Dust Control.
 - f. Noise Control.
 - g. SPCC Plan.
 - h. Stormwater Management Plan and Permit(s) if required.

B. Informational Submittals: Contractor's Health and Safety Plan.

1.03 MOBILIZATION

A. Stormwater Management and Erosion/Sediment Control During Construction:

1. Refer to Section 01 57 13, Temporary Erosion and Sediment Control.
2. Stormwater is not permitted to discharge into the existing wetlands during construction.

B. Mobilization:

1. Mobilization shall include, but not be limited to, these principal items:
 - a. Obtaining required permits.
 - b. Moving Contractor's field office and equipment required for first month operations onto Site.
 - c. Installing temporary construction power, wiring, and lighting facilities.
 - d. Providing onsite communication facilities, including telephones.
 - e. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
 - f. Arranging for and erection of Contractor's work and storage yard.
 - g. Posting OSHA required notices and establishing safety programs and procedures.
 - h. Having Contractor's superintendent at Site full time.

C. Staging/Laydown Areas: Use area designated for Contractor's temporary facilities as shown on Drawings for material storage, Contractor's trailers and employee parking.

1.04 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property.
- B. Keep Owner informed of serious onsite accidents and related claims.
- C. Use of Explosives: No blasting or use of explosives will be allowed onsite.

1.05 VEHICULAR TRAFFIC

- A. General: Contractor's and its subcontractor's employees shall park in the designated storage/laydown area for the Project. Only minimal and authorized vehicles are allowed outside of this area and shall be approved by the Owner. All Contractor's and subcontractor's/supplier's vehicles and delivery trucks shall access the Site through the Contractor's entrance.

B. Traffic Control Plan:

1. Prepare and adhere to traffic control plan as approved by Owner. Show and describe sequences of construction affecting use of roadways, time required for each phase of the Work, provisions for and phasing of construction activities to maintain access, and traffic control systems and features (such as flaggers, electronic display boards, signs, etc.) to provide safe and unrestricted passages for facility operations, commercial and public vehicles. Contractor shall provide flaggers during all times where Contractor's work interfaces or interferes, where allowed, with site operations. Contractor shall also provide an electronic display board at the entrance to the landfill facility warning users of the presence of construction and to follow signs and flaggers directions. This Plan should interface with other Contractor's plans such as staging and storage of materials, health and safety, etc.
2. Changes to the Traffic Control Plan shall be made only by written approval of Owner. Secure approvals for necessary changes so as not to delay progress of the Work.

PART 2 PRODUCTS

2.01 PROJECT SIGN

- A. Provide and maintain one, 8-foot wide by 4-foot tall sign constructed of 3/4-inch exterior density overlaid plywood. Sign should be professionally made and bear the name of the Project, Owner's name, Contractor's name, Engineer's name. Letter shall be blue applied on a white background by a professional sign maker. Paint shall be exterior type enamel. Submit rendering to Owner/Engineer for approval before the sign is made. The Project sign shall be posted near the entrance of the facility where approved by the Owner.

PART 3 EXECUTION

3.01 TEMPORARY UTILITIES

- A. Power:
1. Make arrangements to obtain and pay for electrical power used until final payment and acceptance by Owner.
 2. Electric power will be available at or near Site. Determine type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay costs for electric power used during Contract period.
 3. Cost of electric power will be borne by Contractor.

- B. Lighting: Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.
- C. Heating, Cooling, and Ventilating:
 - 1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage because of temperature or humidity. Costs shall be borne by Contractor.
 - 2. Pay costs of installation, maintenance, operation, removal, and fuel consumed.
- D. Water: Coordinate with Owner for supply, if any, of potable and construction water at the Site.
- E. Sanitary and Personnel Facilities:
 - 1. Provide and maintain facilities for Contractor's employees, Subcontractors, and other onsite employers' employees. Service, clean, and maintain facilities and enclosures.
 - 2. Use of Owner's sanitary facilities by construction personnel will not be allowed.
- F. Telephone Service:
 - 1. Contractor: Arrange and provide onsite telephone service for use during construction.
 - 2. No incoming calls allowed to Owner's facilities.
- G. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

3.02 SAFETY AND PROTECTION

- A. General Description:
 - 1. Landfill related hazards such as landfill gas may be encountered during construction operations. The submission of a bid shall constitute that the Contractor certifies that he is experienced and qualified to anticipate and meet the safety and health requirements of this Project.
 - 2. If hazardous materials are encountered during the Work, the Contractor shall meet the requirements of 29 CFR 1910.134, and all other applicable federal, state, and local regulations.

3. Contractor shall show proof of certification training upon request for all employees of the Contractor and Subcontractors involved in construction activities in accordance with 40 CFR Part 300.38, worker health and safety, and 29 CFR Part 1910.120, Hazardous Waste Operations and Emergency Response. The level of training provided shall be consistent with the worker's job function and responsibilities and with the degree of anticipated hazards.

B. Construction Safety Program:

1. The Contractor shall develop and maintain for the duration of this Contract, a safety program that will effectively incorporate and implement local, state, and federal safety requirements. Submit a written Health and Safety plan for the construction prepared by an experienced professional that is familiar with working in such hazards. At least one copy shall be maintained at the Work Site at all times.
2. Preparation of the written safety plan is the Contractor's responsibility and no statement made in these Special Provisions shall relieve the Contractor and its subcontractors of responsibility for information included and implementation of the safety plan.
3. The Contractor's Health and Safety plan should include, but not be limited to:
 - a. A list of chemical and physical hazards (such as methane exposure and electrical shock), allowable OSHA exposure levels, threshold limit values, other regulatory exposure levels, and the emergency response should an exposure or injury occur.
 - b. An emergency evacuation plan for immediate removal to a hospital or a doctor's care any person who may be injured on the jobsite. The emergency evacuation plan shall include routes to medical treatment, and emergency telephone numbers including hospital, ambulance, fire, sheriff/police, poison control, and others as deemed necessary.
 - c. A list of safety and monitoring equipment at the jobsite and locations where equipment is stored or expected to be maintained.
 - d. Monitoring equipment action levels and recommended responses.
 - e. Confined space entry procedures.
4. The Contractor should provide equipment necessary to protect others at the landfill site from hazards, including, but not limited to, surface irregularities, trenches or excavations. Barricades, lanterns, and proper signs shall be furnished in sufficient amount to safeguard the public and the Work.

C. Safety and Monitoring Equipment:

1. As part of the safety program, maintain at a well-known place at the Job Site, safety equipment applicable to the Work as prescribed by the

- governing safety authorities and all articles necessary for giving first-aid to the injured. Personnel should be adequately trained in the use of safety and monitoring equipment used at the Job Site.
2. On similar projects, the Contractor's safety equipment has included, for example, half or full face respirators, face shields, chemically resistant gloves, chemically resistant clothing (such as Tyvek or PVC splash suits), 5-minute emergency air packs, emergency eyewash equipment, and self-contained breathing apparatus.
 3. On similar projects, the Contractor's monitoring equipment has included:
 - a. Oxygen level indicator (such as the MSA Model 245R).
 - b. Explosive gas (LEL) monitor.
 - c. Hydrogen sulfide indicator.
 4. On similar projects, monitoring equipment often includes a MultiRae or similar photoionizing detector for monitoring volatile organic constituents.
- D. Landfill Gas Safety: Protect employees and others on the Project from fire, explosion, or asphyxiation caused by gases emitted from the existing solid waste landfill and construction operations.
- E. Safe Access by Federal, State, and Local Government Officials: Provide proper facilities for safe access to the Work by authorized government officials.
- F. Accident Reports:
1. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner. In addition, the Contractor shall promptly report in writing to the Owner all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the Site, giving full details and statements of witnesses.
 2. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the claim.
- G. Additional Requirements:
1. Site-Specific Safety Requirements:
 - a. In addition to complying with health and safety rules, regulations, and ordinances promulgated by the local, state, and federal government, the various construction permits, and other sections of the Contract Documents, the Contractor shall be responsible for safety and protection and conform to the provisions herein.

- b. The Contractor shall be responsible for informing his employees and subcontractors and their employees of the potential danger in working on and near landfills and leachate ponds.
 - c. The Contractor shall be familiar with the Safety Guidelines as prepared by the Landfill Gas Division of Solid Waste Association of North America (SWANA).
 - d. The Contractor is advised that the construction of this Project is being performed adjacent to buried wastes and refuse. As these buried materials decompose anaerobically they will generate landfill gas, which typically consists of carbon dioxide (CO₂), methane (CH₄), occasionally hydrogen sulfide (H₂S), and other gases dependent on the composition of the buried materials.
2. Potential for Hazard: Landfill gases have the potential to create hazardous conditions if not controlled or recognized. Some of the hazards include:
- a. Fires that may start spontaneously from exposed and/or decomposing refuse.
 - b. Fires and explosions that may occur from the presence of methane gas.
 - c. Landfill gases and other trace gases that may cause an oxygen deficiency in trenches, vaults, manholes, and structures.
 - d. Hydrogen sulfide, a highly toxic and flammable gas, which may be present.
 - e. Possible caving of trenches and excavations when working over or in refuse fills.
3. Typical Safety Guidelines: Generally accepted procedures to protect workers from the effects of dangers from hazardous gases is through the use of safeguard measures (such as):
- a. Test the atmosphere.
 - b. Ventilate confined spaces.
 - c. Use appropriate safety equipment.
 - d. Provide backup safety personnel.
 - e. Test the Atmosphere:
 - 1) Before entering a trench, manhole, or any other underground vault or excavation, the atmosphere should be tested to detect any adverse environmental conditions. At a minimum, excavation interior should be tested for oxygen deficiency, toxic gases, and combustible gases with gas detector instrument(s). Test instruments should be properly maintained and calibrated. The test should be conducted from top to bottom of the excavation.
 - 2) When testing an excavation or confined space, the presence of explosive gases should be checked first. If this test indicates nonexplosive conditions, asphyxiating (toxic) gases and oxygen deficiency conditions should then be

determined. An oxygen deficiency condition indicates that gases or vapors undetected in the toxic gas test are probably present. Because carbon monoxide, carbon dioxide, hydrogen sulfide, or other vapors may have accumulated in the lower levels of the excavation, their presence would not have been detected in the upper portions of the excavation.

- f. Ventilate Confined Spaces:
 - 1) To mitigate against toxic and combustible gases or oxygen deficiency, an excavation or other confined space should be thoroughly ventilated before entry and during the entire time workers are in the confined space. Forced ventilation is the generally accepted procedure. Start by blowing air in the excavation until the atmosphere is suitable for entry.
 - 2) Blower equipment should be placed upwind from the excavation so that emerging gases will not be ignited by the blower equipment or recycled to the excavation. Blower equipment should also be located away from the exhaust of nearby motor vehicles so that the exhaust fumes are not introduced into the Work area. Gas engine blowers, if used, should also be situated so that their exhaust is not introduced into the excavation. The hose from the blower unit should be set and inspected periodically to ensure that it is not bent or kinked, to guarantee that air flow to the excavation will not be reduced or restricted.
 - g. Use Appropriate Safety Equipment: All personnel should be trained to operate the appropriate safety equipment that would be utilized during the course of their Work. It is the responsibility of the Safety Monitor, or person(s) in authority, to ascertain that all safety equipment is being used when appropriate.
 - h. Provide Backup Safety Personnel: Prior to any personnel entering an excavation or a confined space, a separate individual should be positioned outside the space, but always within eyesight of the personnel within the space, to assist should the workers become overcome by loss of oxygen or exposed to other vapors. A minimum of one emergency escape oxygen pack should be readily available to the observing individual.
- 4. Safety Monitor: The Contractor shall provide a person who will be designated as the Safety Monitor. The Safety Monitor shall be thoroughly trained with respect to safety related regulations and in rescue procedures and the use of safety equipment and gas detectors. This person should be present at all times during construction.
 - 5. Safety Program: Supplemental to the Contractor's regular safety program, the Contractor should develop and institute procedures to inform all workers at the Site of the potential for the presence of methane and other landfill gases emanating from the natural

decomposition of refuse buried near the Job Site, and the importance of safety precautions to ensure the safety of workers and the public.

6. No smoking is allowed onsite.

3.03 PROTECTION OF WORK AND PROPERTY

A. General:

1. Perform Work within right-of-way and easements in a systematic manner that minimizes inconvenience to Owner's property and operations.
2. Maintain in continuous service existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
3. Where completion of the Work requires temporary or permanent removal or relocation of existing utility, coordinate activities with owner of said utility and perform work to their satisfaction.
4. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
5. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
6. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
7. Notify property owners and utility offices that may be affected by construction operation at least 2 days in advance: Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
8. Do not impair operation of existing sewer system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
9. Maintain original Site drainage wherever possible.

B. Site Security:

1. Erect a temporary security fence as necessary to protect Contractor's equipment and materials. Maintain fence throughout construction period.

2. Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.

C. Barricades and Lights:

1. Provide as required by the applicable Vehicle Code and in sufficient quantity to safeguard public and the Work.
2. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of Contractor's employees, other employer's employees, and others who may be affected by the Work.
3. Provide to protect existing facilities and adjacent properties from potential damage.
4. Locate to enable access by facility operators.
5. Illuminate barricades and obstructions with warning lights from sunset to sunrise.

D. Signs and Equipment:

1. Conform to requirements of manual published by the Washington State Department of Transportation.
2. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.
3. Use signage as needed to alert users of the facility of construction hazards, which would include equipment crossings, surface irregularities, grade changes, and trenches or excavations in or near roadways and in other access areas.

E. Trees and Plantings:

1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on Drawings to remain undisturbed.
2. In event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
3. Replace each plant that dies as a result of construction activities.

F. Existing Structures:

1. Where Contractor contemplates removal of small structures such as mailboxes, signposts, and culverts that interfere with Contractor's operations, obtain approval of property owner and Owner.
2. Move mailboxes to temporary locations accessible to postal service.

3. Replace items removed in their original location and a condition equal to or better than original.
- G. Finished Construction: Protect finished floors and concrete floors exposed as well as those covered with composition tile or other applied surfacing.
- H. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris and protect them from erosion and sediment transport.
- I. Dewatering: Construct, maintain, and operate cofferdams, channels, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain areas of the Work free from ponded water.
- J. Archaeological Finds:
 1. General: Should finds of an archaeological or paleontological nature be made within Site limits, immediately notify Owner and proceed in accordance with General Conditions. Continue the Work in other areas without interruption.
- K. Endangered and Threatened Species:
 1. Take precautions necessary and prudent to protect native endangered and threatened flora and fauna.
 2. Notify Owner of construction activities that might threaten endangered and threatened species or their habitats.
 3. Owner will mark areas known as habitats of endangered and threatened species prior to commencement of onsite activities.
 4. Additional areas will be marked by Owner as other habitats of endangered and threatened species become known during construction.

3.04 TEMPORARY CONTROLS

- A. Air Pollution Control:
 1. Minimize air pollution from construction operations.
 2. Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
 3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or

periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.

4. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists.

B. Noise Control:

1. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels and any noise ordinances.
2. If required by ordinance, prepare a Noise Control Plan. The plan shall mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments.

C. Water Pollution Control:

1. Divert sanitary sewage and nonstorm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to existing waterway.
2. Prior to commencing excavation and construction, obtain Owner's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and dewatering pump discharges.
3. Comply with Section 01 57 13, Temporary Erosion and Sediment Control, for stormwater flow and surface runoff.
4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

- D. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities as specified in Section 01 57 13, Temporary Erosion and Sediment Control, to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.

3.05 STORAGE YARDS AND BUILDINGS

- A. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.

B. Temporary Storage Buildings:

1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.

3.06 ACCESS ROADS

- A. Utilize existing roads. Alignments shall be approved by Owner.
- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.
- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Coordinate with Owner detours and other operations affecting traffic and access. Provide at least 72 hours' notice to Owner of operations that will alter access to Site.
- F. Upon completion of construction, restore ground surface disturbed by access road construction to original grade. Replace damaged or broken culverts with new culvert pipe of same diameter and material.

3.07 PARKING AREAS

- A. Provide parking facilities for personnel working on Project. No employee or equipment parking will be permitted outside of the designated storage/laydown area for the Project.

3.08 VEHICULAR TRAFFIC

- A. Conduct the Work to interfere as little as possible with site operations.
- B. Whenever it is necessary to cross or obstruct roadways, provide and maintain suitable and safe detours, or other temporary expedients for accommodation operations.

- C. Do not block more than one-half the roadway at a time. Whenever possible, widen shoulder on opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.
- D. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary accesses where required. Cleanup operations shall follow immediately behind backfilling.
- E. When flaggers and guards are deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.
- F. Do not block off emergency vehicle accesses without written permission from fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. Furnish Contractor's night emergency telephone numbers to police department.
- G. Detours: where required (and approved) construct and maintain detour(s) around the Work.
- H. Coordinate traffic routing with the Owner at all times.

3.09 CLEANING DURING CONSTRUCTION

- A. In accordance with General Conditions, as may be specified in other specification sections, and as required herein.
- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At the end of each work day, pick up and dispose of debris. Maintain the Project Site in a neat and orderly fashion at all times.
- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least weekly, dispose of such waste materials, debris, and rubbish offsite.

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUBMITTALS

- A. Action Submittals: Product/vendor data for commercial products.
- B. Information Submittals: Stormwater Management Plan with Stormwater Pollution Prevention Plan (SWPPP), Spill Prevention and Control Plan (SPCC), Construction General Permit (NOI and NOT), and all other applicable and appropriate provisions for stormwater, erosion/sediment control and spill prevention and containment during construction.

1.02 GENERAL

- 1. The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and file a Notice of Intent (NOI) with the Department of Ecology for a Construction General Permit (CGP). Furthermore, the Contractor shall be liable for instituting and maintain all best management practices during the construction period and protecting wetlands. At the end of construction, the Contractor shall ensure all of the permanent erosion and sediment control features are in place and stable, remove any temporary measures (as required by the Owner), and file a Notice of Termination (NOT) to terminate the CGP.
- 2. All required construction period erosion and sediment control measures must be installed and functional prior to beginning Work.
- 3. Stormwater is not permitted to discharge into the wetland area during construction before being treated.
- B. Contractor is required to manage stormwater and stabilization of soil to prevent erosion during the entire construction period. This Work shall be coordinated with permanent stabilization practices as specified in Section 31 32 00, Soil Stabilization. The Work shall include the furnishing of all Work, materials, and equipment to perform such Work and services to implement such practices. Contractor is responsible for improving and maintaining any and all existing temporary erosion control measures in which Contractor's construction work necessitates the need for such measures, installing new measures, and removing control measures at completion of Work (at Owner's discretion).
- C. The minimum areas requiring soil erosion and sediment control measures are indicated on Drawings. Additional measures and features shall be implemented by the Contractor as necessary whereby implementing best management practices for management of stormwater and erosion during

construction, including those areas where dewatering water will be discharged. The right is reserved to modify the use, location, and quantities of soil erosion and sediment control measures based on activities of the Contractor and as the Engineer considers to be in the best interest of the Owner.

- D. Standard erosion and sediment control features that may be applicable to this Project may be found in the standard details on Drawings as follows:

Standard Detail No.	Title
3125-130	Gravel Construction Entrance
3125-135	Wheel Wash
3125-140	Temporary Stockpile Construction Sequence and Erosion Protection Covering
3125-160	Check Dams
3125-165	Sediment Fence
3125-170	Straw Bales in Ditches
3125-180	Vegetated (V-Notch) Stormwater Ditch
3125-190	Riprap Discharge Apron

- E. Temporary soil erosion stabilization and sedimentation control consist of the following elements:
1. Maintenance of existing permanent or temporary storm drainage piping channel systems, and temporary erosion control already established by Owner, as necessary.
 2. Construction of new permanent and temporary storm drainage piping and channel systems, as necessary.
 3. Construction of temporary erosion control facilities such as sediment fences, check dams, etc.
- F. The Contractor shall be responsible for phasing Work in areas allocated for Contractor's use during this Project, including any proposed stockpile areas, to restrict sediment transport. This will include installation of any temporary erosion control devices, ditches, or other facilities.
- G. The areas set aside for the Contractor's use during the Project may be temporarily developed to provide satisfactory working, staging, and administrative areas for Contractor's use. Preparation of these areas shall be in accordance with other requirements contained within these Specifications and shall be done in a manner to both control all sediment transport away from the area.

- H. Sediment transport and erosion from working stockpiles shall be controlled and restricted from moving beyond the immediate stockpile area by construction of temporary toe-of-slope ditches and accompanying sediment fences, as necessary. The Contractor shall keep these temporary facilities in operational condition by regular cleaning, regrading, and maintenance. Stockpiles remaining in place longer than 14 calendar days shall be considered permanent stockpiles for purposes of erosion and sediment control.
- I. The Contractor shall maintain all elements of the Soil Erosion Stabilization and Sedimentation Control systems and facilities to be constructed during this Project for the duration of his activities on this Project. All accesses to these features shall also have BMPs to control erosion and sediment transport. Systems shall be turned over to Owner until permanent soil stabilization systems are in-place. Formal inspections made jointly by the Contractor and the Engineer shall be conducted every 2 weeks or after a significant storm event to evaluate the Contractor's conformance to the requirements of these Specifications.
- J. All silt traps, if and as required, shall be cleaned of collected sediment after every storm or as determined from the biweekly inspections. Cleaning shall be done in a manner that will not direct the sediment into the storm drain piping system. Removed sediment shall be taken to an area selected by the Engineer where it can be cleaned of sticks and debris, then allowed to dry. Final sediment and debris disposal shall be onsite as designated by Engineer.
- K. Replacement or repair of failed or overloaded sediment fences, rock check dams, or other temporary erosion control devices shall be accomplished by the Contractor within 2 calendar days after receiving written notice from the Engineer.
- L. Unpaved earth drainage ditches shall be regraded as needed to maintain original grade and remove sediment buildup. If a ditch becomes difficult to maintain, the Contractor shall cooperate with the Engineer and install additional erosion control devices such as check dams, temporary paving, or sediment fences as directed by the Engineer.
- M. If the Contractor has not complied with any of the above maintenance efforts to the satisfaction of the Engineer within 2 calendar days after receiving written notification from the Engineer, the Owner shall have the prerogative of engaging others to perform any needed maintenance or cleanup, including removal of accumulated sediment at constructed erosion control facilities, and deduct from the Contractor's monthly partial payment the costs for such efforts plus a \$500 administration fee.
- N. Design erosion and sediment controls to handle peak runoff resulting from 25-year, 24-hour storm event based on U.S. Weather Bureau, "Rainfall-

Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years,” Technical Paper No. 40, 1981.

- O. Size temporary stormwater conveyances based on procedures presented in U.S. Department of Agriculture, “Urban Hydrology for Small Watersheds,” Soil Conservation Service Engineering Technical Release No. 55, 1986.

PART 2 PRODUCTS

2.01 SEDIMENT FENCE

A. Sediment Fence Geotextile (Filter Fabric):

1. Pervious Sheet: Polyester, polypropylene, or nylon filaments, woven into a uniform pattern distinct and measurable openings.
 - a. Filaments: Resistant to damage from exposure to ultraviolet rays and heat.
 - b. Material Edges: Finish so that filaments retain their relative positions under stress.
 - c. Manufacturer and Product: Propex Geosynthetics, Chattanooga, TN; Geotex® 2127.
2. In accordance with the following requirements:

Physical Property	Required Value	Test Method
Apparent Opening Size (AOS)	20 MaxARV	U.S. Standard Sieve Size
Grab Tensile Strength, lb, min.	MinARV 95 MD x 80 XD ¹	ASTM D4632
Mullen Burst Strength, psi, min.	250 MinARV	ASTM D3786
Ultraviolet Radiation Resistance, % Strength Retention	80 MinARV	ASTM D4355
Water Flow Rate, gpm/ft ²	5 MinARV	ASTM D4491
¹ MD indicates machine direction and XD indicates cross direction.		

B. Support Fence:

1. Wire Mesh Material: As recommended by manufacturer of geotextile; strong enough to support applied loads.
2. Support Posts: 2-inch by 4-inch Douglas Fir or steel angle-iron fence posts.

3. Fasteners: Heavy-duty wire staples at least 1-inch long, tie wires, or hog rings, as recommended by manufacturer of geotextile.

2.02 STRAW BALES

- A. Machine baled clean straw of oats, wheat, barley, or rye, free from seed of noxious weeds, using standard baling wire or twine.
- B. Posts for Straw Bales: 2-inch by 2-inch Douglas Fir or commercially available manufactured metal posts.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall install erosion and sediment control measures and maintain in accordance with the Drawings.
- B. Refer to Section 31 32 00, Soil Stabilization, for specification of products, installation, and maintenance requirements.

3.02 SUPPORT FENCE AND GEOTEXTILE FOR SEDIMENT FENCE

- A. Place filter fence following ground contours and not parallel to slopes.
- B. One-piece geotextile or continuously sewn to make one-piece geotextile for full height of the fence, including portion buried in the toe trench.
- C. When joints are necessary, splice geotextile together only at a support post, with a minimum 6-inch overlap, and securely fasten both ends to support post.
- D. Geotextile shall not extend more than 24 inches above the ground surface. Securely fasten to upslope side of each support post using ties. Geotextile shall not be stapled to existing trees.
- E. Fasten wire mesh material support fence securely to upslope side of post fasteners. Extend wire into the trench a minimum of 4 inches, and not more than 36 inches above the ground surface.
- F. Take precaution not to puncture geotextile during installation. Repair or replace damaged area.
- G. Remove support fence and geotextile after upslope area has been permanently stabilized. Immediately dress sediment deposits remaining after the geotextile fence has been removed to conform to existing grade. Prepare and seed graded area.

3.03 SEDIMENT FENCE

- A. Install prior to starting earth disturbing activities upslope of fence as prescribed in Contractor's Erosion Control Plan.
- B. One-piece geotextile or continuously sewn to make one-piece geotextile for full height of the fence, including portion buried in the toe trench.
- C. When joints are necessary, splice geotextile together only at a support post, with a minimum 6-inch overlap, and securely fasten both ends to support post.
- D. Geotextile shall not extend more than 24 inches above the ground surface. Securely fasten to upslope side of each support post using ties. Geotextile shall not be stapled to existing trees.
- E. Fasten wire mesh material support fence securely to upslope side of post fasteners. Extend wire into the trench a minimum of 4 inches, and not more than 36 inches above the ground surface.
- F. Take precaution not to puncture geotextile during installation. Repair or replace damaged area.
- G. Remove support fence for geotextile after upslope area has been permanently stabilized. Immediately dress sediment deposits remaining after the geotextile fence has been removed to conform to existing grade. Prepare and seed graded area.

3.04 STRAW BALES

- A. Embed minimum of 4 inches in flat-bottomed trench or alongside slope.
- B. Place with ends tightly abutting or overlapped. Corner abutment is not acceptable.
- C. Install so that bale bindings are oriented around the sides and not over the top and bottom of the bale.
- D. Use two posts for each bale. Drive posts through the bale until top of post is flush with top of bale.
- E. Wedge loose straws in any gaps between bales.

END OF SECTION

SECTION 01 64 00
OWNER-FURNISHED PRODUCTS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Seller: The party under separate contract with Owner to furnish the products or special services specified herein.

1.02 OWNER-FURNISHED PRODUCTS

- A. A knuckle-boom crane for installation in the new waste transfer building.
 - 1. Quantity: One.
 - 2. Point of Receipt: Carothers Road Solid Waste Facility, Whitman County, WA.
 - 3. Estimated Date of Arrival: To be determined.
 - 4. Estimated Weight of Product: To be provided.
 - 5. Special Handling or Storage Instructions: To be provided.
 - 6. Associated Special Services to be provided by Owner:
 - a. Certification of proper installation by the manufacturer.
 - b. Training of Owner's personnel.

1.03 INFORMATION TO BE FURNISHED BY OWNER

- A. Shop Drawings related to Owner-furnished products will be made available for Contractor's use in performing the Work under this Section.
- B. Manufacturer's installation, operation, and maintenance instructions for Owner-furnished products will be made available.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Show layout, location, and identification of materials provided by Contractor for installation of Owner-furnished products.
 - b. Include pipe, fittings, valves, specialties, hangers, supports, equipment, and required specialties.
 - c. Accurately show bolt patterns, openings in floors, walls, and other parts of structure, as applicable.
 - d. Provide electrical and instrumentation diagrams to indicate connecting and interconnecting electrical and control work.
 - e. Submit complete list of materials to be furnished.

1.05 TRANSFER OF PRODUCTS

- A. Unless indicated otherwise, items will be furnished f.o.b. the Project Site.
- B. Upon delivery, conduct with Owner or Engineer a joint inspection for the purpose of identifying product, general verification of quantities, and observation of apparent condition. Such inspection will not be construed as final or as receipt of any product that, as a result of subsequent inspections and tests, are determined to be nonconforming.
- C. Damaged or incomplete products to be returned for replacement will not be unloaded, except as necessary to expedite return shipment. Owner will submit claims for transportation damage and expedite replacement of damaged, defective, or deficient items.
- D. Indicate signed acceptance of delivery on a copy of the invoice.
- E. If Contractor is not prepared to accept delivery of Owner-furnished products by either the specified Estimated Date of Arrival or such Owner-confirmed delivery date, as specified herein, associated costs incurred by Owner shall be borne by Contractor. Such costs may include, but not be limited to, demurrage, interest, insurance costs, additional administrative and engineering costs, additional factory and field technical support, additional storage and reshipping costs, cost escalation, and extended warranty costs due.

1.06 UNLOADING, STORAGE AND MAINTENANCE

- A. Subsequent to transfer, Contractor shall have complete responsibility for unloading Owner-furnished products. Unload product in accordance with manufacturers' instructions, or as specified.
- B. Store, protect, and maintain product to prevent damage until final acceptance of completed Work. Damage to or loss of products after date of transfer to Contractor shall be repaired to original condition, or replaced with new identical products, at the discretion of Engineer.
- C. Maintain complete inventory of all Owner-furnished products after their transfer to Contractor.

1.07 SCHEDULING AND SEQUENCING

- A. Include sequencing constraints specified herein as part of Progress Schedule.
- B. Owner will keep Contractor informed of probable delivery date changes.
- C. Owner will confirm delivery date with Contractor 10 days prior to scheduled delivery, and within 24 hours of expected delivery time.

- D. Where a preinstallation meeting is required by this Section, provide a minimum of 10 days' advance written notice to Owner of the proposed date for starting installation.
- E. Provide a minimum of 10 days notice to Owner that Owner-furnished product is ready for all special services listed herein to be furnished by Owner through its contract with seller. Contractor shall bear the cost of all damages assessed to Owner by seller resulting from delays caused by Contractor.

1.08 EXTRA MATERIALS

- A. Unless otherwise specified, Owner will take acceptance of, and be responsible for storing associated extra materials and special tools upon delivery.

1.09 PREINSTALLATION MEETING

- A. Arrange and attend a preinstallation meeting with the Engineer, Owner, and seller to review general procedures, erection and installation instructions, and installation sequence.
- B. Additional meetings prior to installation may be required, as determined by Owner, to transmit Owner's installation instructions to Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in conformance with Owner-furnished product Shop Drawings and installation instructions.
- B. Provide all interconnecting structures, equipment, piping, electrical and instrumentation work, finish painting, and appurtenances to achieve a complete and functional system.
- C. Anchor Bolts:
 - 1. Where required, provide anchor bolts, fasteners, washers, and templates needed for installation of Owner-furnished equipment.
 - 2. Size and locate anchor bolts in accordance with Owner-furnished product Shop Drawings and installation instructions.
- D. Mechanical and electrical equipment shall be properly aligned, plumb and level, with no stresses on connecting piping or conduit.
- E. Verify direction of motor rotation before starting equipment drives.

- F. Verify operability and safety of electrical system needed to operate equipment. Check electrical system for continuity, phasing, grounding, and proper functions.

3.02 PRODUCT PROTECTION

- A. Immediately after installation, lubricate components in accordance with manufacturer's instructions.
- B. Follow manufacturer's instructions for protection and maintenance during storage, after installation but prior to testing and startup, and after startup but prior to acceptance.
- C. Furnish incidental supplies including lubricants, cleaning fluids, and similar products as needed for protecting and maintaining the Owner-furnished products.

3.03 TESTS AND INSPECTION

- A. Perform tests and inspections of installed products in accordance with requirements shown herein, Section 01 91 14, Equipment Testing and Facility Startup, and manufacturer's instructions.
 - 1. Functional Test.

END OF SECTION

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment.
 - a. Record Documents: As required in General Conditions.
 - b. Approved Shop Drawings and Samples: As required in the General Conditions.
 - c. Special bonds, Special Guarantees, and Service Agreements.
 - d. Consent of Surety to Final Payment: As required in General Conditions.
 - e. Releases or Waivers of Liens and Claims: As required in General Conditions.
 - f. Releases from Agreements.
 - g. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01 29 00, Payment Procedures.
 - h. Extra Materials: As required by individual specification sections.

1.02 RECORD DOCUMENTS

A. Quality Assurance:

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.
4. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may

result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.
- B. In the event Contractor is unable to secure written releases:
 - 1. Inform Owner of the reasons.
 - 2. Owner or its representatives will examine the Site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.
 - 3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory bond in a sum to cover legal Claims for damages.
 - 4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate Claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 - 1. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.
 - 2. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
 - 3. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation:

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by Engineer.

C. Making Entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from Drawings.
 - 2) Red when showing information added to Drawings.
 - 3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by “cloud” drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, and Engineer’s written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as is described in previous subparagraph above.
 - a. Clearly identify the item by accurate note such as “cast iron drain,” “galv. water,” and the like.
 - b. Show, by symbol or note, vertical location of item (“under slab,” “in ceiling plenum,” “exposed,” and the like).
 - c. Make identification so descriptive that it may be related reliably to Specifications.

3.02 FINAL CLEANING

- A. At completion of the Work or of a part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire Site or parts thereof, as applicable.
1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and Engineer.
 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
 4. Clean all windows.
 5. Clean and wax wood, vinyl, or painted floors.
 6. Broom clean exterior paved driveways and parking areas.
 7. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 8. Rake clean all other surfaces.
 9. Remove snow and ice from access to buildings.
 10. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.
 11. Leave water courses, gutters, and ditches open and clean.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary and final data in the form of an instructional manual and on electronic media.

B. Instructional Manual Format:

1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
2. Size: 8-1/2 inches by 11 inches, minimum.
3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - a. Project title.
 - b. Designate applicable system, equipment, material, or finish.
 - c. Identity of separate structure as applicable.
 - d. Identify volume number if more than one volume.
 - e. Identity of general subject matter covered in manual.
4. Spine:
 - a. Project title.
 - b. Identify volume number if more than one volume.
5. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
6. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
7. Paper: 20-pound minimum, white for typed pages.
8. Text: Manufacturer's printed data, or neatly typewritten.
9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
10. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.

C. Electronic Media Format:

1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format on CD.
 - b. Files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
 - c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.

1.05 SUBMITTALS

A. Informational:

1. Data Outline: Submit two copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data:
 - a. Submit three copies for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be forwarded to Resident Project Representative.
 - 3) One copy will be retained in Engineer's file.
 - c. If data does not meet conditions of the Contract:
 - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.
 - 2) Engineer's comments will be retained in Engineer's file.
 - 3) Resubmit two copies revised in accordance with Engineer's comments.
3. Final Data: Submit two copies in format specified herein.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content For Each Unit (or Common Units) and System:

1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.

3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - 1) Provide reinforced, punched, binder tab; bind in with text.
 - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - 4) Identify specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. Control and flow diagrams.
 - d. Coordinate Drawings with Project record documents to assure correct illustration of completed installation.
5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for Owner's personnel, including:
 - a) Proper procedures in event of failure.
 - b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:
 - 1) Startup, break-in, routine, and normal operating instructions.
 - 2) Test procedures and results of factory tests where required.
 - 3) Regulation, control, stopping, and emergency instructions.
 - 4) Description of operation sequence by control manufacturer.
 - 5) Shutdown instructions for both short and extended duration.
 - 6) Summer and winter operating instructions, as applicable.
 - 7) Safety precautions.
 - 8) Special operating instructions.
 - d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 2) Guide to troubleshooting.
 - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
6. Guarantee, Bond, and Service Agreement: In accordance with Section 01 77 00, Closeout Procedures.

B. Content for Each Electric or Electronic Item or System:

1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including control and lighting systems.
2. Circuit directories of panelboards.
3. Electrical service.
4. Control requirements and interfaces.
5. Communication requirements and interfaces.
6. List of electrical relay settings, and control and alarm contact settings.
7. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
8. As-installed control diagrams by control manufacturer.
9. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Startup and shutdown sequences, normal and emergency.
 - c. Safety precautions.
 - d. Special operating instructions.
10. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
11. Manufacturer's printed operating and maintenance instructions.
12. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or subunits.
2. Format:
 - a. Use Maintenance Summary Form bound with this Section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.

3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

1.07 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:

1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENT

A. The supplement listed below, following "End of Section," is part of this Specification.

1. Maintenance Summary Form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a. Name _____ Telephone No. _____

b. Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

8. LUBRICANT LIST

[illegible]

9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

Part No.	Description	Unit	Quantity	Unit Cost

Note: Identify parts provided by this Contract with two asterisks.

SECTION 01 88 15
SEISMIC ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section covers requirements for seismic anchorage and bracing for equipment and nonstructural components required in accordance with the International Building Code (IBC).

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Institute of Steel Construction (AISC).
 - 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
 - 3. International Code Council (ICC): International Building Code (IBC).
 - 4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Seismic Restraint Manual: Guidelines for Mechanical Systems.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General: Contractor shall be responsible for designing code required seismic attachments, braces, and anchors to the structure for elements of the architectural, mechanical, and electrical systems included in the Work in accordance with this Section unless a design is specifically provided within the Contract Documents.
- B. Design Requirements:
 - 1. In accordance with 2009 IBC, Section 1613 and Chapter 13 of ASCE 7.
 - 2. Architectural, mechanical, electrical and other nonstructural systems, components, and elements permanently attached to the structure shall be designed to transfer the component seismic forces specified in ASCE 7 Section 13.3.1 to the structure.
 - 3. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2.
 - 4. Seismic anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of Washington.
 - 5. Nonstructural Components: Design as nonbuilding structures for components with weights greater than or equal to 25 percent of the effective seismic weight of the overall structure.

6. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
 7. Design seismic attachments, braces, and anchorages for parts or elements of the architectural, mechanical, and electrical systems in accordance with the provisions of the International Building Code and the following site-specific seismic criteria, unless noted otherwise on Drawings.
 - a. Site-Specific Spectral Response Coefficients:
 - 1) Short Period Mapped Maximum Considered Earthquake, 5 Percent Damped: S_s equals 0.311g.
 - 2) 1 Period Mapped Maximum Considered Earthquake, 5 Percent Damped: S_1 equals 0.0975g.
 - 3) Short Period Design Spectral Response Acceleration, 5 Percent Damped: S_{DS} equals 0.321g.
 - 4) 1 Second Period Design Spectral Response Acceleration, 5 Percent Damped: S_{D1} equals 0.156g.
 8. Site Class: D.
 9. Seismic Design Category (SDC): C, unless noted otherwise. Same as supporting structure's SDC, as shown on Drawings.
 10. Occupancy Category: II, unless noted otherwise. The anchorage and bracing Occupancy Category shall be the same as that for supporting structure as shown on Drawings.
 11. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component $I_p = 1.5$.
 12. Component Important Factor:
 - a. $I_p = 1.0$, unless noted otherwise.
 - b. I_p shall be taken as 1.5 for components needed for or whose failure could impair continued operation of hazardous or essential facilities.
 - c. I_p shall be taken as 1.5 for components that contain hazardous materials or that are required for life safety to be functional after a seismic event.
 - d. Refer to Section 01 45 33, Special Inspection, Observation, and Testing, for list of designated components which I_p equals 1.5.
- C. In accordance with ASCE 7, the following are exempt from the requirements of the Section for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment:
1. Mechanical and electrical components with I_p equals 1.0.

- D. Support Drawings and calculations for electrical distribution components shall be provided if any of the following conditions apply:
1. I_p is equal to 1.5 and conduit diameter is greater than 2.5-inch trade size.
 2. I_p is equal to 1.5 and the total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
 3. Supports are cantilevered up from floor.
 4. Supports include bracing to limit deflection and are constructed as rigid welded frames.
 5. Attachments utilize spot welds, plug welds, or minimum size welds as defined by AISC.
- E. Other seismic design and detailing requirements identified in ASCE 7, Chapter 13, are required to be provided for new architectural, mechanical, and electrical component, system, or equipment.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Submit Shop Drawings with supporting calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.
 - b. Submitted anchorage drawings and calculations are identified as IBC deferred submittals and will be submitted to and accepted by permitting agency prior to installation of component, equipment or distribution system.
 - c. List of architectural, mechanical, and electrical equipment weighing more than 20 pounds, and electrical, piping, and mechanical distribution systems weighing more than 5 pounds per foot shall be anchored, unless specifically exempted hereinafter.
 - d. Manufacturers' engineered seismic hardware product data.
 - e. Seismic attachment assemblies' drawing; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
 - f. Submittals will be rejected if proposed anchorage method would create an overstressed condition of supporting member. Revise anchorages and strengthening of structural support so there is no overstressed condition.

B. Informational Submittals:

1. Seismic Anchorage and Bracing Calculations: For seismic attachments, braces, and anchorages. Include IBC and Project-specific criteria as noted on General Structural Note Sheets on Drawing, in addition to

manufacturer's specific criteria used for the design; sealed by a civil or structural engineer registered in the State of Washington.

2. Manufacturer's seismic hardware installation requirements.

PART 2 PRODUCTS

2.01 GENERAL

- A. Attachments and supports transferring seismic loads to structure shall be constructed of materials and products suitable for the application and be designed and constructed in accordance with the design criteria shown on Drawings and nationally recognized standards.
- B. In accordance with Section 05 50 00, Metal Fabrications. Source quality control shall be in accordance with the referenced Section.
- C. Provide anchor bolts, and concrete and masonry anchors for anchorage of equipment in concrete or masonry in accordance with Section 05 50 00, Metal Fabrications. Size of anchor bolts and anchors, and required minimum embedment and spacing shall be based on calculations submitted by Contractor.
- D. Powder actuated fasteners and sleeve anchors shall not be used for seismic attachments and anchorage where resistance to tension loads is required. Expansion anchors, other than undercut anchors, shall not be used for nonvibration isolated mechanical equipment rated over 10 hp.

PART 3 EXECUTION

3.01 GENERAL

- A. Make seismic attachments, bracing, and anchorage in such a manner that component seismic force is transferred to the lateral force resisting system of the structure through a complete load path.
- B. Overall seismic anchorage system shall provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Components mounted on vibration isolation systems shall have snubbers in each horizontal direction and vertical restraints where required to resist overturning.
- D. Anchor piping in such a manner as to ensure piping system has adequate flexibility and expansion capabilities at flexible connections and expansion joints. Piping and ductwork suspended more than 12 inches below the supporting structure shall be braced for seismic effects to avoid significant bending of the hangers and their attachments, unless high-deformability

pipng is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet.

- E. Tall and narrow equipment such as motor control centers and telemetry equipment shall be anchored at the base and within 12 inches from the top of the equipment, unless approved otherwise by Engineer.
- F. Architectural, mechanical, or electrical components shall not be attached to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Such attachments shall also not be made across building expansion and contraction joints.

3.02 INSTALLATION

- A. Do not install components or their seismic anchorages or restraints prior to review and acceptance by Engineer and permitting agency.
- B. Notify Engineer upon completion of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY CONTROL

- A. Field Quality Control shall be in accordance with Section 05 50 00, Metal Fabrications.

END OF SECTION

SECTION 01 91 14
EQUIPMENT TESTING AND FACILITY STARTUP

PART 1 GENERAL

1.01 DEFINITIONS

- A. Facility: Entire Project, or an agreed-upon portion, including all of its unit processes.
- B. Functional Test: Test or tests in presence of Engineer and Owner to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- C. Performance Test: Test or tests performed after any required functional test in presence of Engineer and Owner to demonstrate and confirm individual equipment meets performance requirements specified in individual specification sections.
- D. Unit Process: As used in this section, a unit process is a portion of the facility that performs a specific process function.
- E. Facility Performance Demonstration:
 - 1. A demonstration, conducted by Contractor, with assistance of Owner, to demonstrate and document the performance of the entire operating facility, both manually and automatically (if required), based on criteria developed in conjunction with Owner and as accepted by Engineer.
 - 2. Such demonstration is for the purposes of (i) verifying to Owner entire facility performs as a whole, and (ii) documenting performance characteristics of completed facility for Owner's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of Contractor, unless such performance is otherwise specified.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Facility Startup and Performance Demonstration Plan.
 - 2. Functional and performance test results.
 - 3. Completed Unit Process Startup Form for each unit process.
 - 4. Completed Facility Performance Demonstration/Certification Form.

1.03 FACILITY STARTUP AND PERFORMANCE DEMONSTRATION PLAN

- A. Develop a written plan, in conjunction with Owner's operations personnel; to include the following:
 - 1. Step-by-step instructions for startup of each unit process and the complete facility.
 - 2. Unit Process Startup Form (sample attached), to minimally include the following:
 - a. Description of the unit process, including equipment numbers/nomenclature of each item of equipment and all included devices.
 - b. Detailed procedure for startup of the unit process, including valves to be opened/closed, order of equipment startup, etc.
 - c. Startup requirements for each unit process, including water, power, chemicals, etc.
 - d. Space for evaluation comments.
 - 3. Facility Performance Demonstration/Certification Form (sample attached), to minimally include the following:
 - a. Description of unit processes included in the facility startup.
 - b. Sequence of unit process startup to achieve facility startup.
 - c. Description of computerized operations, if any, included in the facility.
 - d. Contractor certification facility is capable of performing its intended function(s), including fully automatic operation.
 - e. Signature spaces for Contractor and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Facility Startup Meetings: Schedule, in accordance with requirements of Section 01 31 19, Project Meetings, to discuss test schedule, test methods, materials, chemicals and liquids required, facilities operations interface, and Owner involvement.
- B. Contractor's Testing and Startup Representative:
 - 1. Designate and furnish one or more personnel to coordinate and expedite testing and facility startup.
 - 2. Representative(s) shall be present during startup meetings and shall be available at all times during testing and startup.

- C. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.
- D. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and startup.
- E. Owner will:
 - 1. Provide water, power, chemicals, and other items as required for startup, unless otherwise indicated.
 - 2. Operate process units and facility with support of Contractor.
 - 3. Provide labor and materials as required for laboratory analyses.

3.02 EQUIPMENT TESTING

- A. Preparation:
 - 1. Complete installation before testing.
 - 2. Furnish qualified manufacturers' representatives, when required by individual specification sections.
 - 3. Obtain and submit from equipment manufacturer's representative Manufacturer's Certificate of Proper Installation Form, in accordance with Section 01 43 33, Manufacturers' Field Services, when required by individual Specification sections.
 - 4. Equipment Test Report Form: Provide written test report for each item of equipment to be tested, to include the minimum information:
 - a. Owner/Project Name.
 - b. Equipment or item tested.
 - c. Date and time of test.
 - d. Type of test performed (Functional or Performance).
 - e. Test method.
 - f. Test conditions.
 - g. Test results.
 - h. Signature spaces for Contractor and Engineer as witness.
 - 5. Cleaning and Checking: Prior to beginning functional testing:
 - a. Calibrate testing equipment in accordance with manufacturer's instructions.
 - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
 - c. Lubricate equipment in accordance with manufacturer's instructions.
 - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
 - e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.

- f. Check power supply to electric-powered equipment for correct voltage.
 - g. Adjust clearances and torque.
 - h. Test piping for leaks.
6. Ready-to-test determination will be by Engineer based at least on the following:
- a. Acceptable Operation and Maintenance Data.
 - b. Notification by Contractor of equipment readiness for testing.
 - c. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
 - d. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.
 - e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
 - f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
 - g. Equipment and electrical tagging complete.
 - h. Delivery of all spare parts and special tools.

B. Functional Testing:

- 1. Conduct as specified in individual specification sections.
- 2. Notify Owner and Engineer in writing at least 10 days prior to scheduled date of testing.
- 3. Prepare Equipment Test Report summarizing test method and results.
- 4. When, in Engineer's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by Engineer/Owner's signature as witness on Equipment Test Report.

C. Performance Testing:

- 1. Conduct as specified in individual specification sections.
- 2. Notify Engineer and Owner in writing at least 10 days prior to scheduled date of test.
- 3. Performance testing shall not commence until equipment has been accepted by Engineer as having satisfied functional test requirements specified.
- 4. Type of fluid, gas, or solid for testing shall be as specified.
- 5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.
- 6. Prepare Equipment Test Report summarizing test method and results.
- 7. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as to

conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on Equipment Test Report.

3.03 STARTUP OF UNIT PROCESSES

- A. Prior to unit process startup, equipment within unit process shall be accepted by Engineer as having met functional and performance testing requirements specified.
- B. Startup sequencing of unit processes shall be as chosen by Contractor to meet schedule requirements.
- C. Make adjustments, repairs, and corrections necessary to complete unit process startup.
- D. Startup shall be considered complete when, in opinion of Engineer, unit process has operated in manner intended for 5 continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.
- E. Significant Interruption: May include any of the following events:
 - 1. Failure of Contractor to provide and maintain qualified onsite startup personnel as scheduled.
 - 2. Failure to meet specified functional operation.
 - 3. Failure of any critical equipment or unit process that is not satisfactorily corrected.
 - 4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected.
 - 5. As determined by Engineer.
- F. A significant interruption will require startup then in progress to be stopped. After corrections are made, startup test period to start from beginning again.

3.04 FACILITY PERFORMANCE DEMONSTRATION

- A. When, in the opinion of Engineer, startup of all unit processes has been achieved, sequence each unit process to the point that facility is operational.
- B. Demonstrate proper operation of required interfaces within and between individual unit processes.
- C. After facility is operating, complete performance testing of equipment and systems not previously tested.
- D. Document, as defined in Facility Startup and Performance Demonstration Plan, the performance of the facility.

- E. Certify, on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic operation.

3.05 SUPPLEMENTS

- A. Supplements listed below, following “End of Section,” are a part of this Specification:
 - 1. Unit Process Startup Form.
 - 2. Facility Performance Demonstration/Certification Form.

END OF SECTION

UNIT PROCESS STARTUP FORM

OWNER: _____ PROJECT: _____

Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.): _____

Evaluation Comments: _____

FACILITY PERFORMANCE DEMONSTRATION/CERTIFICATION FORM

OWNER: _____ **PROJECT:** _____

Unit Processes Description (List unit processes involved in facility startup):

Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):

Contractor Certification that Facility is capable of performing its intended function(s), including fully automatic operation:

Contractor: _____ **Date:** _____, 20____

Engineer: _____ **Date:** _____, 20____
(Authorized Signature)

SECTION 03 01 32
REPAIR OF VERTICAL AND OVERHEAD CONCRETE SURFACES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Concrete Institute (ACI):
 - a. 301, Specifications for Structural Concrete.
 - b. 506.2, Specification for Shotcrete.
2. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - e. C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - f. C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - g. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - j. C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - k. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - l. C596, Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
 - m. C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
 - n. C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - o. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

- p. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
- q. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
- r. D4259, Standard Practice for Abrading Concrete.
- s. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and reinforcing steel. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. High-Pressure Water Blasting: Sometimes referred to as hydro-demolition. Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. Low-Pressure Spray Mortar: Mortar suitable to be applied by low-pressure spraying, and in small areas may be applied by hand troweling.
- E. New Concrete: As defined in Section 03 30 00, Cast-in-Place Concrete.
- F. Rebound: Shotcrete material, mostly aggregates, that bounce off a surface against which shotcrete was projected.
- G. Shotcrete: Mortar pumped through hose and projected at high velocity.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Product data sheets for each material supplied.
 - 2. Samples: Mesh reinforcement and mesh anchor.
 - 3. Drawings or photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location.

4. Drawings indicating results of sounding for hollow areas including location, size, and estimated quantity of hollow-sounding areas for each repair location.

B. Informational Submittals:

1. Repair Mortar System: Manufacturer's preparation and installation instructions.
2. Mesh manufacturer's installation instructions and allowable load criteria.
3. Written description of equipment proposed for concrete removal and surface preparation.
4. Certificates:
 - a. Shotcrete Nozzleman: Current ACI Certification for each proposed nozzleman.
 - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, that proposed repair mortar systems:
 - 1) Meet or exceed specified performance criteria when tested in accordance with Article Field Quality Control.
 - 2) Are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces that are exposed to weather.
 - c. Mortar Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
5. Statements of Qualification:
 - a. Repair mortar system applicator.
 - b. Repair mortar system manufacturer's representative.
 - c. Independent Testing Laboratory.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Repair Mortar System Applicator:
 - a. Trained and experienced applicator recognized or certified by repair mortar system manufacturer.
 - b. For Repair System B, in lieu of recognition or certification, demonstrate application of repair mortar manufacturer's system and obtain Certification of Proper Installation, in accordance with Article Manufacturer's Services.
2. Repair Mortar System Manufacturer's Representative: As specified in Section 01 43 33, Manufacturers' Field Services.

B. Demonstration Mockup for Low-Pressure Spray Mortar Repair System:

1. For each type of repair mortar system to be used, prepare one demonstration mockup in each vertical and overhead orientation of at least 10 feet by 10 feet with average thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in each vertical and overhead orientation that is representative of area to be repaired in terms of size, thickness, and reinforcement, may be used for demonstration in lieu of mockups; subject to acceptance by Engineer.
2. Repair Mortar System Manufacturer's Demonstration:
 - a. Schedule time for manufacturer's demonstration of repair system proposed for Project.
 - b. Prepare mortar to specified consistency for testing and placement.
 - c. Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.
 - d. Prepare surface area in advance of demonstration and obtain manufacturer's acceptance of preparation for each type of application.
 - e. Demonstrate the following:
 - 1) Mixing and application equipment capabilities and procedures, including flow of material from nozzle or sprayer.
 - 2) Nozzle operator and person in charge of low-pressure sprayer, capabilities and ability to follow prescribed application procedures and properly operate equipment and apply surface repair materials.
 - f. Compression Strength Test: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
 - g. Tensile Bond Test: Test in situ for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

C. Demonstration Mockup for Hand-Applied Repair Mortar:

1. For each type of repair mortar system to be used, prepare one demonstration mockup in each vertical and overhead orientation of average size and thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in each vertical and overhead orientation that is representative of area to be repaired in terms of size, thickness, and reinforcement, may be used for demonstration in lieu of mockups; subject to acceptance by Engineer.

2. Repair Mortar System Manufacturer's Demonstration:
 - a. Schedule time for manufacturer's demonstration of repair system proposed for Project.
 - b. Prepare mortar to specified consistency, for testing and placement.
 - c. Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.
 - d. Prepare surface area in advance of demonstration and obtain manufacturer's acceptance of preparation for each type of application.
 - e. Demonstrate mixing and application procedures.
 - f. Compression Strength Test: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
 - g. Tensile Bond Test: Test in situ for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

D. Prerepair Conference:

1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Engineer.
2. Schedule and conduct prior to conducting mockups and incorporation of respective products into Project. Notify Engineer of location and time.
3. Agenda shall include, but not limited to:
 - a. Review of field conditions. Conduct field observations of Work to be performed.
 - b. Based on above observations, repair material manufacturer's technical representative shall confirm material selection and make Project-specific repair method recommendations.
 - c. Technical representative for repair material manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
 - d. Other specified requirements requiring coordination.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 SYSTEM B—LOW-PRESSURE SPRAY MORTAR

- A. One- or two-component, cement based, fiber reinforced, shrinkage compensated, gray in color, with a minimum 30-minute working time.
- B. Cured materials mixed in accordance with manufacturer's instructions shall conform to the following criteria:
 - 1. Compressive Strength, ASTM C109/C109M at 28 Days: 6,000 psi minimum.
 - 2. Flexural Strength, ASTM C348 at 28 Days: 1,100 psi minimum.
 - 3. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent, at 28 Days: 3,000 psi minimum.
 - 4. Direct Tensile Bond Strength, ASTM C496/C496M at 28 Days: 300 psi minimum.
 - 5. Drying Shrinkage, ASTM C157/C157M Modified at 28 Days or ASTM C531: 0.1 percent maximum.
 - 6. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 800 coulombs maximum.
 - 7. System shall not produce a vapor barrier.
 - 8. Sprayable, extremely low permeability, sulfate resistant, easy to use and requiring only addition of water.
 - 9. Free of chlorides and other chemicals causing corrosion.
- C. Manufacturers and Products:
 - 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Emaco S88 CI.
 - 2. Sika Corp., Lyndhurst, NJ; SikaRepair 224.
 - 3. Euclid Chemical Co., Cleveland, OH; Tamms Structural Mortar.

2.02 SYSTEM C—POLYMER-MODIFIED REPAIR MORTAR

- A. Polymer-modified, one- or two-component, cementitious based, chloride resistant, flowable, gray in color, working time of 20 minutes minimum, surface renovation mortar.
- B. Cured Mortar Properties:
 - 1. Compressive Strength, ASTM C109/C109M at 28 Days: 7,000 psi minimum.
 - 2. Flexural Strength, ASTM C348 at 28 Days: 1,200 psi minimum.
 - 3. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent at 28 Days: 2,000 psi minimum.

4. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 psi minimum.
5. Freeze Thaw Resistance, ASTM C666/C666M, at 300 Cycles: 90 percent RDM.
6. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 800 coulombs maximum.

C. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Emaco R300 CI.
2. Sika Corp., Lyndhurst, NJ; SikaTop 123 PLUS.
3. Euclid Chemical Co., Cleveland, OH; DuralTop Gel.

2.03 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards, as specified in Section 03 30 00, Cast-in-Place Concrete.

2.04 REINFORCEMENT

- A. Deformed Reinforcing Bars: ASTM A615/A615M, Grade 60, where welding is not required.
- B. Mesh Reinforcement: Welded wire fabric flat sheets with spacing of wires and wire size in accordance with ASTM A185/A185M, wire 75 ksi minimum tensile strength per ASTM A82/A82M, and repair mortar system manufacturer's recommendations.
- C. Tie Wire: 16-gauge, galvanized.
- D. Mesh Anchors:
1. Manufacturers and Products:
 - a. Powers Fastening, Inc., Brewster, NY; Tie Wire Version of Power-Stud.
 - b. Hilti Fastener Systems, Tulsa, OK; Kwik Bolt II HHDCA, 1/4-inch ceiling hanger.

2.05 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
1. Mixed Bonding Agent Properties:
 - a. Pot Life: 75 minutes to 105 minutes.

- b. Contact Time: 24 hours.
 - c. Color: Concrete Gray.
- 2. Cured Cementitious Adhesive Properties:
 - a. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 psi minimum.
 - b. Flexural Strength, ASTM C348: 1,000 psi minimum.
 - c. Slant Shear Bond Strength, ASTM C882/C882M at 14 Days:
 - 1) 2-Hour Open Time: 2,500 psi minimum.
 - 2) 24-Hour Open Time: 2,000 psi minimum.
- 3. Bonding agent shall not produce a vapor barrier.
- 4. Compatible with repair system.

B. Manufacturers and Products:

- 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Emaco P24.
- 2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
- 3. Euclid Chemical Co., Cleveland, OH: Dural Prep AC.

2.06 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.07 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 EXECUTION

3.01 GENERAL

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system. Refer to Section 03 30 00, Cast-in-Place Concrete.

3.02 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Engineer, and review proposed extent of repair with Engineer.
- B. Remove unsound, honeycombed, deteriorated, or otherwise defective areas of concrete from Work areas.
 - 1. Use 8,000 psi minimum high-pressure water blasting machine as required for Site conditions.
 - 2. Remove concrete to abrade substrate concrete surfaces to a minimum amplitude roughness of 3/16 inch measured between high and low

points with a 3-foot-long straightedge, in accordance with ASTM D4259.

3. Where final surface is required to be flush with existing adjacent surface remove existing concrete depth as required for application of minimum thickness of repair mortar.
- C. Do not use power-driven jackhammers, chipping hammers, or scabblers unless water blasting is not permitted or practical due to Site conditions, or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.
- D. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.
- E. Remove unsound concrete to satisfaction of Engineer.
- F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or feathered edges. Avoid cutting embedded reinforcing steel. Roughen polished saw-cut edge by high-pressure water blasting.
- G. Remove concrete adjacent to reinforcing bar to a minimum of 1-inch clearance around reinforcing bar for application and bonding of new repair mortar to circumference of exposed reinforcing bar if one or more of the following surface conditions exist:
 1. 50 percent or more of circumference around reinforcing bar is exposed during concrete removal.
 2. 25 percent or more of circumference around reinforcing bar is exposed during concrete removal and corrosion is present to extent that more than 25 percent loss of section has occurred.
 3. Otherwise evident that bond between existing concrete and reinforcing bar has been destroyed or has deteriorated as determined by Engineer.
- H. Clean exposed reinforcing steel bars of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258.
- I. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contaminants from prepared areas.
- J. Dampen repair areas at least 6 inches beyond area to receive repair mortar for at least 24 hours to provide saturated surface dry (SSD) condition without

standing water at time of application of mortar as required by and in accordance with repair mortar manufacturer's printed instructions.

- K. Collect and dispose of spent water and concrete debris from removal operations offsite in manner and location acceptable to Owner.

3.03 REINFORCEMENT INSTALLATION

- A. Provide reinforcement when existing reinforcement is not exposed, and when mortar application is more than 3 inches deep.
- B. Replace deteriorated reinforcing with new reinforcing equivalent in cross-sectional area to original reinforcing.
- C. Install mesh anchors in accordance with mesh manufacturer's instructions.
- D. Fasten reinforcing bars to mesh anchors with tie wire to prevent from moving during placement of repair mortar.
- E. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to mesh anchors, or to reinforcement fastened to mesh anchors, with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
- F. Coat exposed new and existing reinforcing bars and reinforcement mesh with cementitious reinforcement coating at same time as substrate concrete is coated, as specified below, per repair mortar and cementitious reinforcement coating manufacturers' printed instructions.

3.04 PROTECTION

- A. Protect adjacent surfaces, and equipment, from being damaged by overshooting, rebound, and dust, as applicable for repair mortar system used, from low-pressure spray mortar.

3.05 SYSTEM B—LOW-PRESSURE SPRAY MORTAR APPLICATION

- A. Mix mortar in accordance with manufacturer's printed instructions.
- B. After priming prepared substrate concrete surface per manufacturer's recommendations, apply mortar by low-pressure spraying equipment, unless noted otherwise.
- C. Bonding Agent:
 - 1. Use bonding agent for hand applied areas, in accordance with repair mortar manufacturer's instructions.

2. Application of repair mortar over bonding agent shall be completed within time frame recommended by bonding agent manufacturer.
 3. Consult with manufacturer for optimum and minimum acceptable degrees of surface tackiness of coat.
- D. Work mortar firmly and quickly into repair area.
 - E. Finish repair mortar to smooth even surface matching adjacent concrete surface with steel trowel finish.
 - F. Provide evaporation retardant at full strength.
 - G. Cure as specified in Article Curing.

3.06 SYSTEM C—POLYMER-MODIFIED REPAIR MORTAR APPLICATION

- A. Mix mortar in accordance with manufacturer's printed instructions.
- B. Bond Coat: Apply to prepared substrate concrete surface before application of mortar in accordance with repair mortar manufacturer's printed instructions. Do not apply more bond coat than can be covered with mortar before bond coat dries. Do not retemper bond coat.
- C. Place mortar by hand and trowel to specified surface finish, in accordance with requirements of repair material's printed instructions.
- D. Finish repair mortar to smooth even surface matching adjacent concrete surface with steel trowel finish.
- E. Cure as specified in Article Curing, and in accordance with manufacturer's printed instructions.

3.07 CURING

- A. Prior to curing, apply water fog to repair mortar system in accordance with repair mortar system manufacturer's printed instructions.
- B. Cure in accordance with repair mortar manufacturer's printed instructions.
- C. Where permitted by repair mortar manufacturer's printed instructions, commence water curing after repair mortar system application and when curing will not cause erosion of mortar.
- D. Continuously water cure repair mortar system for a period of 7 days.

- E. Do not cure using curing compound or membrane, unless method is part of repair mortar system manufacturer's printed instructions and approval is obtained from Engineer.
- F. Cure intermediate layers of repair mortar in accordance with repair mortar manufacturer's printed instructions.
- G. Where curing compound is permitted by repair mortar system manufacturer, apply curing compound in accordance with Section 03 39 00, Concrete Curing.

3.08 FIELD QUALITY CONTROL

- A. Sounding for Hollow Areas:
 - 1. Light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
 - 2. Mark hollow areas for removal and replacement.
- B. Compression Strength Test:
 - 1. Test in accordance with ASTM C109/C109M, except modified by making samples using repair mortar.
 - 2. Obtain production samples of mixed wet mortar materials from nozzle, or mixer, during construction for compliance with Specifications for testing at 7 days, and 28 days.
 - 3. Provide a minimum of three samples for each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing.
 - 4. Record location where repair mortar is being applied at time production samples are obtained.
- C. Direct Tension Bond Test:
 - 1. In Situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M.
 - 2. Record locations on in situ bond tests on each type of applied repair mortar.
 - 3. Laboratory Bond Testing:
 - a. Core two 2-1/2-inch or 3-inch-diameter core drilled samples per ASTM C42/C42M for each 2,000 square feet of repair work for direct tension bond testing. Where total area repaired is less than 2,000 square feet, core two 2-1/2-inch or 3-inch diameter samples for direct tension bond testing. Record locations of core drilled samples extracted from each type of applied repair mortar.

- b. Cut core samples through cured mortar repair and into base concrete to total depth equal to at least 2.5 times repair mortar thickness. Avoid core drilling through structural element.
- c. Saw cut core samples after removal to trim base concrete thickness to same thickness as mortar so bond line is at center of prepared core sample.
- d. Bond core samples to steel plates at each end using epoxy bonding agent.
- e. Perform tension bond testing using calibrated independent test laboratory equipment and eyebolts or threaded connectors tapped and threaded into baseplate in order that tension load is concentric with center of core sample.
- f. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.

D. Retest mortar repairs that do not meet test requirements.

E. Repair and fill holes using same repair mortar where core samples have been removed.

3.09 MORTAR REPAIR FAILED TEST

A. Remove and replace unacceptable Work.

B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge. Remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein above.

C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein above.

D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein above.

E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein above.

3.10 MANUFACTURER'S SERVICES

A. Provide repair mortar system manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for review acceptability of surface preparation, mixing and installation assistance, training of repair mortar system applicators, inspection, and Certification of Proper Installation.

3.11 CLEANING

- A. Remove overshot low-pressure spray repair mortar and rebound materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of or repair areas, finishing, and curing, and dispose offsite at an approved disposal site.

END OF SECTION

SECTION 03 01 33
REPAIR OF HORIZONTAL CONCRETE SURFACES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American Association of State Highway and Transportation Officials (AASHTO): T277, Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
 2. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - e. C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - f. C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - g. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - j. C469, Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
 - k. C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - l. C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
 - m. C779/C779M, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - n. C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - o. C928/C928M, Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.

- p. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
- q. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
- r. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
- s. D638, Standard Test Method for Tensile Properties of Plastics.
- t. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
- u. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
- v. D4259, Standard Practice for Abrading Concrete.
- w. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and reinforcing steel. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. High-Pressure Water Blasting: Sometimes referred to as hydro-demolition. Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. New Concrete: As defined in Section 03 30 00, Cast-in-Place Concrete.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Product data sheets for each material supplied.
 - 2. Drawings or photographs indicating location, size, estimated quantity, and proposed repair mortar system for each repair location.

3. Drawings indicating results of sounding for hollow areas including location, size, estimated quantity, of hollow-sounding areas for each repair location.

B. Informational Submittals:

1. Repair Mortar System: Manufacturer's preparation and installation instructions.
2. Written description of equipment proposed for concrete removal and surface preparation.
3. Certificates:
 - a. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, that material meets requirements of ASTM C928/C928M.
 - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, that proposed repair mortar systems meet or exceed specified performance criteria when tested in accordance with Article Field Quality Control.
 - c. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, that repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on horizontal surfaces that are exposed to weather, and receive traffic.
 - d. Mortar Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
 - e. Confirmation epoxy resin bonding agents conform to ASTM C882/C882M.
4. Statements of Qualification:
 - a. Repair mortar system applicator.
 - b. Independent Testing Laboratory.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Repair Mortar System Applicator: Trained and experienced applicator endorsed by repair mortar system manufacturer.
2. Repair Mortar System Manufacturer's Representative: As specified in Section 01 43 33, Manufacturers' Field Services.

B. Independent Testing Laboratory: Meet criteria stated in ASTM E699.

C. Demonstration Mockup for Repair Mortar.

D. Prerepair Conference:

1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.
3. Agenda shall include, but not limited to:
 - a. Review of field conditions. Conduct field observations of the Work to be performed.
 - b. Based on above observations, repair material manufacturer's technical representative shall confirm material selection and make Project specific repair method recommendations.
 - c. Technical representative for repair material manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
 - d. Other specified requirements requiring coordination.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 SYSTEM NO. 2—HIGH EARLY STRENGTH REPAIR MORTAR

- A. One- or two-component, fast-setting, high early strength repair mortar.
- B. Manufacturer and Product:
 1. Euclid Chemical Co., Cleveland, OH; VersaSpeed.

2.02 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards, as specified in Section 03 30 00, Cast-in-Place Concrete.

2.03 REINFORCEMENT

- A. Deformed Reinforcing Bars: ASTM A615/A615M, Grade 60, where welding is not required.
- B. Mesh Reinforcement: Welded wire fabric flat sheets with spacing of wires and wire size in accordance with ASTM A185/A185M, wire 75 ksi minimum tensile strength per ASTM A82/A82M, and repair mortar system manufacturer's recommendations.
- C. Tie Wire: 16-gauge, galvanized.
- D. Mesh Anchors:
 - 1. Manufacturers and Products:
 - a. Powers Fastening, Inc., Brewster, NY; Tie Wire Version of Power-Stud.
 - b. Hilti Fastener Systems, Tulsa, OK; Kwik Bolt II HHDCa, 1/4-inch ceiling hanger.

2.04 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
 - 1. Mixed Bonding Agent Properties:
 - a. Pot Life: 75 minutes to 105 minutes.
 - b. Contact Time: 24 hours.
 - c. Color: Concrete gray.
 - 2. Cured Cementitious Adhesive Properties:
 - a. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.
 - b. Flexural Strength, ASTM C348: 1,000 psi minimum.
 - c. Slant Shear Bond Strength, ASTM C882/C882M:
 - 1) 2-Hour Open Time: 2,500 psi minimum.
 - 2) 24-Hour Open Time: 2,000 psi minimum.
 - d. Bonding agent shall not produce a vapor barrier.
 - e. Compatible with repair mortar system.
- B. Manufacturers and Products:
 - 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Emaco P24.
 - 2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
 - 3. Euclid Chemical Co., Cleveland, OH; Dural Prep AC.

2.05 EPOXY BONDING AGENT

- A. Two-component, moisture insensitive, 100 percent solids epoxy resin.
- B. Tensile Strength, ASTM D638, at 14 Days: 4,400 psi minimum.
- C. Elongation at Break, ASTM D638: 1.49 percent minimum.
- D. Compressive Strength, ASTM D695, at 28 Days for Application Temperature of 73 Degrees F to 77 Degrees F: 8,000 psi minimum.
- E. Bond Strength, ASTM C882/C882M, at 14 Days: 1,800 psi minimum.
- F. Pot Life, at 73 Degrees F to 77 Degrees F: 75 minutes minimum.
- G. Manufacturer and Product:
 - 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Concrese Liquid LPL when ambient temperature is 73 degrees F or higher.

2.06 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.07 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 EXECUTION

3.01 GENERAL

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system.

3.02 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Engineer. Review proposed extent of repair with Engineer.
- B. Remove unsound, deteriorated, or otherwise defective areas of concrete from Work areas.
 - 1. Use 8,000 psi minimum high-pressure water blasting machine, as appropriate to suit Site conditions.
 - 2. Remove concrete to abrade substrate concrete surface to a minimum amplitude roughness of 3/16 inch measured between high and low

- points with a 3-foot-long straightedge, in accordance with ASTM D4259.
3. Where final surface is required to be flush with existing adjacent surface, remove existing concrete depth as required for application of minimum thickness of repair mortar.
- C. Do not use power-driven jackhammers, chipping hammers, scabblers, or scarifiers unless water blasting is not permitted or practical due to Site conditions, or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.
 - D. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.
 - E. Remove unsound concrete to satisfaction of Engineer.
 - F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or feathered edges. Avoid cutting embedded reinforcing steel. Roughen polished saw-cut edge by high-pressure water blasting.
 - G. Remove concrete adjacent to reinforcing bar to a minimum of 1-inch clearance around reinforcing bar for application and bonding of new repair mortar to entire circumference of exposed reinforcing bar if one or more of the following surface conditions exist:
 1. 50 percent or more of circumference around reinforcing bar is exposed during concrete removal.
 2. 25 percent or more of circumference around reinforcing bar is exposed during concrete removal and corrosion is present to extent that more than 25 percent loss of section has occurred.
 3. Otherwise evident that bond between existing concrete and reinforcing bar has been destroyed or has deteriorated as determined by Engineer.
 - H. Clean exposed reinforcing steel bars of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258.
 - I. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contaminants from prepared areas.
 - J. Substrate Concrete Surface in Areas to Receive Repair Mortar System:
Dampen repair areas at least 6 inches beyond area to receive repair mortar for

at least 24 hours to provide saturated surface dry (SSD) condition without standing water at time of application of mortar, as required by and in accordance with repair mortar manufacturer's printed instructions.

K. Spalled Joints:

1. Saw cut edge 1 inch deep and 6 inches back from old joint.
2. Remove unsound concrete and concrete between saw cut and joint.
3. Place wood or fiber spacer to thickness of joint at joint line.

L. Overlays:

1. Square cut edges to a minimum of 1/4 inch deep.
2. Do not feather edge area.
3. Perform special preparation recommended by mortar manufacturer.

M. Collect and dispose of spent water and concrete debris from removal operations offsite in manner and location acceptable to Owner.

3.03 REINFORCEMENT INSTALLATION

- A. Provide reinforcement when existing reinforcement is not exposed, and when mortar application is more than 4 inches deep.
- B. Replace deteriorated reinforcing with new reinforcing equivalent in cross-sectional area to original reinforcing.
- C. Fasten reinforcement to chairs with tie wire to prevent from moving during placement of repair mortar.
- D. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to mesh anchors, or to reinforcement fastened to mesh anchors, with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
- E. Coat exposed new and existing reinforcing bars with cementitious reinforcement coating at the same time as substrate concrete is coated, as specified below, per repair mortar and cementitious reinforcement coating manufacturers' printed instructions.

3.04 PROTECTION

- A. Protect adjacent surfaces, and equipment from spillage of repair mortar and dust, as applicable for repair mortar system used.

3.05 APPLICATION

A. General:

1. Repair Mortar System No. 2: Patches, joints, or overlays 1/2 inch to 3 inches thick. Return to service in 3 hours to 7 days.

B. Repair Mortar System:

1. Remove standing and free water from prepared area.
2. Apply bond scrub coat of mortar to prepared surface in accordance with manufacturer's instructions. Do not apply more scrub coat of mortar than can be covered with repair mortar before scrub coat begins drying.
3. Immediately place mixed repair mortar into prepared area from one side to the other side.
4. Work material firmly into bottom and sides of patch to ensure a good continuous bond.
5. Level repair mortar and screed to elevation of existing concrete.
6. Finish to same texture as existing concrete around patch.
7. Repair Mortar System No. 5 screed or use self-leveling mixture to obtain a uniform and plane surface.

C. Joint Repair:

1. Remove joint spacer when repair mortar is hard enough that a pointed trowel will penetrate surface less than 1/2 inch.
2. When repair mortar is cured and ready for use, fill joint in accordance with repair mortar system manufacturer's instructions.

3.06 FINISHING

- #### A.
- Spray full strength evaporation retardant on fresh concrete to prevent rapid drying during hot and windy weather.

3.07 CURING

- #### A.
- Apply curing compound in accordance with Section 03 39 00, Concrete Curing.

3.08 FIELD QUALITY CONTROL

A. Sounding for Hollow Areas:

1. Chain drag or light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
2. Mark hollow areas for removal and replacement.

B. Compression Strength Test:

1. Test in accordance with ASTM C109/C109M, except modified by making samples using repair mortar.
2. Obtain production samples of mixed materials from mixer during construction for compliance with Specifications.
3. Provide minimum of three samples for each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater for testing.
4. Record location where repair mortar is being applied at time production samples are obtained.

C. Direct Tension Bond Test:

1. In Situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M.
2. Record locations on in situ bond tests on each type of applied repair mortar.
3. Laboratory Bond Testing:
 - a. Core two 2-1/2-inch or 3-inch diameter core drilled samples per ASTM C42/C42M for each 2,000 square feet of repair work for direct tension bond testing. Where total area repaired is less than 2,000 square feet, core two 2-1/2-inch or 3-inch diameter samples for direct tension bond testing. Record locations of core drilled samples extracted from each type of applied repair mortar.
 - b. Cut core samples through cured mortar repair and into base concrete to total depth equal to at least 2.5 times repair mortar thickness.
 - c. Saw cut core samples after removal to trim base concrete thickness to same thickness as mortar so bond line is at center of prepared core sample.
 - d. Bond core samples to steel plates at each end using epoxy bonding agent.
 - e. Perform tension bond testing using calibrated independent test laboratory equipment and eyebolts or threaded connectors tapped and threaded into baseplate in order that tension load is concentric with the center of the core sample.
 - f. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.

D. Retest mortar repairs that do not meet test requirements.

E. Repair and fill holes using same repair mortar where core samples have been removed.

3.09 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge, remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein above.
- C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein above.

3.10 MANUFACTURERS' SERVICES

- A. Provide mortar manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for advice on product selection, review acceptability of surface preparation, mixing and installation assistance, inspection, and Certification of Proper Installation.

3.11 CLEANING

- A. Remove excess repair mortar materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of repair areas, finishing, and curing, and dispose offsite at approved disposal site.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Concrete Institute (ACI):
 - a. 117/117R, Standard Tolerances for Concrete Construction and Materials.
 - b. 318/318R, Building Code Requirements for Structural Concrete and Commentary.
 - c. 347, Guide to Formwork for Concrete.

1.02 DESIGN REQUIREMENTS

- A. Design formwork in accordance with ACI 347 and ACI 318/318R to provide concrete finishes specified in Section 03 30 00, Cast-in-Place Concrete.
- B. When high range water reducer (superplasticizer) is used in concrete mix, forms shall be designed for full hydrostatic pressure per ACI 347.
- C. Make joints in forms watertight.
- D. Limit panel deflection to 1/360th of each component span to achieve tolerances specified.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Layout of panel joints and tie hole pattern.
 - b. Form Ties-Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.
 - c. Manufacturer's data for form release agent.
 - 2. Samples: One each as follows:
 - a. Form ties.
- B. Informational Submittals:
 - 1. Statement of qualification for formwork designer.
 - 2. Manufacturer's Certificate of Proper Installation in accordance with Section 01 43 33, Manufacturers' Field Services.

1.04 QUALIFICATIONS

- A. Formwork Designer: Formwork, falsework, and shoring design shall be by an engineer licensed in the state of Washington.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Wall Forms and Underside of Slabs and Beams:
 - 1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel in “new and undamaged” condition, of sufficient strength and surface smoothness to produce specified finish.
- B. Column Forms:
 - 1. Rectangular Columns: As specified for walls.
- C. Sandblasted Surface Forms: Medium density overlay plywood for flat concrete surfaces to be sandblasted.
- D. Painted Surface Forms: High-density overlay plywood for flat concrete surfaces to be painted.
- E. All Other Forms: Materials as specified for wall forms.
- F. Form Release Agent:
 - 1. Material: Release agent shall not bond with, stain, or adversely affect concrete surfaces, and shall not impair subsequent treatments of concrete surfaces when applied to forms. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations and can be used in potable water facilities.
 - 2. Manufacturers and Products:
 - a. BASF, Shakopee, MN; MBT, Rheofinish 211.
 - b. Cresset Chemical Company; Crete-Lease 20-VOC.
 - c. Unitex Chemicals; Farm Fresh.
 - d. Atlas Construction Supply, Inc.; Bio-Guard.
- G. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces.

H. Form Ties:

1. Material: Steel.
2. Spreader Inserts:
 - a. Conical or spherical type.
 - b. Design to maintain positive contact with forming material.
 - c. Furnish units that will leave no metal closer than 1.5 inches to concrete surface when forms, inserts, and tie ends are removed.
3. Wire ties not permitted.
4. Flat bar ties for panel forms; furnish plastic or rubber inserts with minimum 1.5-inch depth and sufficient dimensions to permit patching of tie hole.
5. Water Stop Ties: For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
 - a. Integral steel water stop 0.103 inch thick and 0.625 inch in diameter tightly and continuously welded to tie.
 - b. Neoprene water stop 3/16 inch thick and 15/16 inch diameter whose center hole is one half diameter of tie, or molded plastic water stop of comparable size.
 - c. Orient water stop perpendicular to tie and symmetrical about center of tie.
 - d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
6. Through-Bolts: Tapered minimum 1-inch diameter at smallest end.
7. Elastic Vinyl Plug:
 - a. Design and size of plug to allow insertion with tool to enable plug to elongate and return to original length, and diameter upon removal forming watertight seal.
 - b. Manufacturer and Product: Dayton/Richmond Co., Miamisburg, OH; A58 Sure Plug.

PART 3 EXECUTION

3.01 FORM SURFACE PREPARATION

- A. Thoroughly clean form surfaces that will be in contact with concrete or that have been in contact with previously cast concrete, dirt, and other surface contaminants prior to coating surface.
- B. Exposed Wood Forms in Contact with Concrete: Apply form release agent as recommended by the manufacturer.
- C. Steel Forms: Apply form release agent to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

3.02 ERECTION

- A. General: Unless specified otherwise, follow applicable recommendations of ACI 347.
- B. Beveled Edges (Chamfer):
 - 1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
 - 2. Where beveled edges on existing structures are other than 3/4 inch, obtain Engineer's approval of size prior to placement of beveled edge.
- C. Wall Forms:
 - 1. Do not reuse forms with damaged surfaces.
 - 2. Locate form ties and joints in an uninterrupted uniform pattern.
 - 3. Inspect form surfaces prior to installation to assure conformance with specified tolerances.
- D. Form Tolerances: Provide forms in accordance with ACI 117/117R, ACI 347, and ACI 318/318R and the following tolerances for finishes specified:
 - 1. Wall Tolerances:
 - a. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
 - b. Wall Type W-A:
 - 1) Plumb within 1/4 inch in 10 feet or within 1 inch from top to bottom for walls over 40 feet high.
 - 2) Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in all directions.
 - c. Wall Type W-B:
 - 1) Plumb within 1/8 inch in 10 feet or within 1/2 inch from top to bottom for walls over 40 feet high.
 - 2) Depressions in Wall Surface: Maximum 1/8 inch when 10-foot straightedge is placed on high points in all directions.
 - d. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - e. Form Offset: Between adjacent pieces of formwork, facing material shall not exceed 1/8 inch.
 - 2. Beams and Columns Tolerances:
 - a. Exposed Straight Horizontal and Vertical Surfaces: Flat planes within tolerances specified.

- b. Lateral Alignment:
 - 1) Centerlines must be within plus or minus 1/2 inch from dimensions shown.
 - 2) At intersections, centerlines shall intersect within plus or minus 1/2 inch of dimensions shown.
- c. Beam Type B-A:
 - 1) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - 2) Elevations: Within plus or minus 1/2 inch, except where tops of beams become part of finished slab. In this case refer to slab tolerances.
- d. Column Type C-A:
 - 1) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - 2) Plumb within 1/4 inch in 10 feet in all directions with maximum 1/2 inch out-of-plumb at top with respect to bottom.

3.03 FORM REMOVAL

- A. Nonsupporting forms (sides of beams, walls, columns, and similar parts of Work) may be removed after cumulatively curing at not less than 50 degrees F for 24 hours from time of concrete placement if:
 - 1. Concrete is sufficiently hard so as not to sustain damage by form removal operations.
 - 2. Curing and protection operations are maintained.
- B. Elevated Structural Slabs or Beams: In accordance with ACI 318/318R, Chapter 6, and at such time as concrete has reached compressive strength equal to 100 percent of specified 28-day compressive strength as determined by test cylinders.

END OF SECTION

SECTION 03 15 00
CONCRETE JOINTS AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. ASTM International (ASTM):
 - a. A36/A36M, Specification for Carbon Structural Steel.
 - b. A615/A615M, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - c. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - d. A767/A767M, Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - e. C920, Specification for Elastomeric Joint Sealants.
 - f. D226, Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - g. D227, Specification for Coal-Tar Saturated Organic Felt Used in Roofing and Waterproofing.
 - h. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - i. D1056, Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
 - j. D1171, Standard Guide for Evaluating Nonwoven Fabrics.
 - k. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - l. D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 2. Corps of Engineers (COE): CRD-C-572, Corps of Engineers Specifications for Polyvinylchloride Waterstop.
 3. NSF International (NSF): 61, Drinking Water System Components - Health Effects.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Waterstop: Details of splices, method of securing and supporting waterstop in forms to maintain proper orientation and location during concrete placement.
 - b. Construction and Control Joints: Layout and location for each type.
2. Samples: PVC waterstop splice, joint, and fabricated cross of each size, shape, and fitting of waterstop.

B. Informational Submittals:

1. Manufacturer's written instructions for product shipment, storage, handling, installation/application, and repair for:
 - a. Waterstop.
 - b. Joint filler and primer.
 - c. Preformed control joint.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site: Verify delivered materials are in accordance with Specifications and manufacturer's product data sheets prior to unloading and storing onsite.
- B. Storage: Store materials under tarps to protect from oil, dirt, and sunlight.

PART 2 PRODUCTS

2.01 PLASTIC WATERSTOP

- A. Extruded from elastomeric plastic compound of which basic resin shall be prime virgin polyvinyl chloride (PVC). Compound shall not contain scrapped material, reclaimed material, or pigment.
- B. Specific Gravity: Approximately 1.37.
- C. Shore Durometer Type A Hardness: Approximately 80.
- D. Performance Requirements: COE Specification CRD-C-572.
- E. Type: Center bulb with parallel ribs or protrusions on each side of strip center.
- F. Corrugated or tapered type waterstops are not acceptable.

- G. Thickness: Constant from bulb edge to outside stop edge.
- H. Minimum Weight per Foot of Waterstop:
 - 1. 1.60 pounds for 3/8 inch by 6 inches.
 - 2. 2.30 pounds for 3/8 inch by 9 inches.
- I. Factory Fabrications: Use only factory fabrications for intersections, transitions, and changes of direction.
- J. Manufacturers and Products:
 - 1. Vinylex Corp., Knoxville, TN; Catalog No. 03250/VIN: No. RB6-38H (6 inches by 3/8 inch) and No. RB9-38H (9 inches by 3/8 inch).
 - 2. Greenstreak Plastic Products, St. Louis, MO; Catalog No. 03150/GRD: Style 732 (6 inches by 3/8 inch) and Style 735 (9 inches by 3/8 inch).
 - 3. Four Seasons Industries Durajoint, Garrettsville, OH; Catalog No. CSP-162: Type 9 (6 inches by 3/8 inch), and Type 10 (9 inches by 3/8 inch).

2.02 BOND BREAKER

- A. Tape for Joints: Adhesive-backed glazed butyl or polyethylene tape, same width as joint that will adhere to premolded joint material or concrete surface.
- B. Use either bond breaker tape or bond prevention material as specified in Section 03 30 00, Cast-in-Place Concrete, except where tape is specifically called for.

2.03 PREMOLDED JOINT FILLER

- A. Bituminous Type: ASTM D994 or ASTM D1751.

2.04 ACCESSORIES

- A. Joint Sealant: Polyurethane as specified in Section 07 92 00, Joint Sealants.
- B. Nonshrink Grout: As specified in Section 03 62 00, Nonshrink Grouting.
- C. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.
- D. Reinforcing Steel: As specified in Section 03 21 00, Reinforcing Steel.
- E. Nails: Galvanized, as required for securing premolded joint filler.

- F. Masking Tape: As required to temporarily adhere to concrete at each side of joint to receive filler.
- G. Galvanized Rebar at Control Joints: ASTM A767/A767M and ASTM A615/A615M Grade 60 prior to galvanizing.
- H. Ties for PVC Waterstop: "Hog Rings" or grommets for each edge at 12-inch maximum spacing.

PART 3 EXECUTION

3.01 GENERAL

- A. Commence concrete placement after joint preparation is complete.
- B. Time Between Concrete Pours: As specified in Section 03 30 00, Cast-in-Place Concrete.

3.02 SURFACE PREPARATION

- A. Construction Joints: Prior to placement of abutting concrete, clean contact surface:
 - 1. Remove laitance and spillage from reinforcing steel and dowels.
 - 2. Roughen surface to minimum of 1/4-inch amplitude:
 - a. Sandblast after concrete has fully cured.
 - b. Water blast after concrete has partially cured.
 - c. Green cut fresh concrete with high pressure water and hand tools.
 - 3. Perform cleaning so as not to damage waterstop, if one is present.
- B. Control Joint:
 - 1. Coat concrete surfaces above and below plastic waterstop with bond breaker.
 - 2. Do not damage or coat waterstop.

3.03 INSTALLATION OF WATERSTOPS

- A. General:
 - 1. Continuous waterstop (as specified) shall be installed in all construction joints in walls and slabs of water holding basins and channels and in walls of belowgrade structures, unless specifically noted otherwise.
 - 2. Join waterstop at intersections to provide continuous seal.
 - 3. Center waterstop on joint.

4. Secure waterstop in correct position. Tie waterstop to reinforcing steel using grommets, "Hog Rings," or tiewire at maximum spacing of 12 inches. Do not displace waterstop during concrete placement.
5. Repair or replace damaged waterstop.
6. Place concrete and vibrate to obtain impervious concrete in vicinity of joints.
7. Joints in Footings and Slabs:
 - a. Ensure that space beneath plastic waterstop is completely filled with concrete.
 - b. During concrete placement, make visual inspection of waterstop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, then place remaining concrete to full height of slab.

B. Plastic Waterstop:

1. Install in accordance with manufacturer's written instructions.
2. Splice in accordance with waterstop manufacturer's written instructions using Teflon-coated thermostatically controlled heating iron at approximately 380 degrees F.
 - a. Allow at least 10 minutes before new splice is pulled or strained in any way.
 - b. Finished splices shall provide cross section that is dense and free of porosity with tensile strength of not less than 80 percent of unspliced materials.
 - c. Use only factory made waterstop fabrications for all intersections, changes of directions and transitions.
 - d. Field splice permitted only for straight butt welds.
3. Wire looped plastic waterstop may be substituted for plastic waterstop.

3.04 CONTRACTION JOINT INSTALLATION

- A. Place bond breaker above and below stop.
- B. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface.

3.05 CONTROL JOINT INSTALLATION

- A. Locate reinforcing steel as shown.
- B. Install PVC waterstop.
- C. Concrete surfaces shall be dense and smooth.
- D. Install bond breaker to concrete surfaces above and below waterstop.

END OF SECTION

SECTION 03 21 00
REINFORCING STEEL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete and Commentary.
 - b. SP-66, Detailing Manual.
2. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - d. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
3. Concrete Reinforcing Steel Institute (CRSI):
 - a. Placing Reinforcing Bars.
 - b. Manual of Standard Practice.
4. International Code Council (ICC): Evaluation Services Report.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings prepared in accordance with CRSI Manual of Standard Practice and ACI SP-66:
 - a. Bending lists.
 - b. Placing drawings.
2. Welded, metallic sleeve splice, and mechanical threaded connection.

B. Informational Submittals:

1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
 - a. Current ICC Evaluation Services Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.

- b. Verification device threads have been tested and meet requirements for thread quality, in accordance with manufacturer's published methods.
- c. Manufacturer's instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars:

- 1. Includes stirrups, ties, and spirals.
- 2. ASTM A615/A615M, Grade 60, welding of reinforcing is prohibited unless noted otherwise.

B. Mechanical Splices and Connections:

1. Metal Sleeve Splice:

- a. Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of bar.
- b. Manufacturer and Product: Erico Products, Inc., Cleveland, OH; Cadweld T-Series.

2. Mechanical Threaded Connections:

- a. Furnish metal coupling sleeve with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
- b. Manufacturers and Products:
 - 1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
 - 2) Richmond Screw Anchor Co., Inc., Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.

2.02 ACCESSORIES

A. Tie Wire:

- 1. Black, soft-annealed 16-gauge wire.
- 2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:

1. Use precast concrete bar supports and side form spacers, unless noted otherwise. Do not use other types of supports or spacers.
2. Bar supports shall have sufficient strength and stiffness to carry loads without failure, displacement, or significant deformation. Space bar supports so minimum concrete cover is maintained for reinforcing between supports.
3. Use only precast concrete bar supports where concrete surfaces are exposed to weather, earth, water, chloride intrusion, or corrosive chemicals. Bar supports shall be nonconductive and have geometry and bond characteristics that deter movement of moisture from the surface to the reinforcement.
4. Precast concrete supports shall have same minimum strength and shall be made from same materials as that of the concrete in which they are to be embedded. Precast concrete supports shall be cast and properly cured for at least 7 days before use and shall have a wire or other device cast into each block for the purpose of attaching them securely to reinforcing steel.
5. In Beams, Columns, Walls, and Slabs Exposed to View after Form Removal: Use small precast concrete blocks made of same color as concrete in which they are embedded.
6. Design and fabricate special bar supports for top reinforcing bars in slabs where standard bar supports do not possess necessary geometry, strength, or stiffness.
7. Precast Concrete Supports: Total bond precast high performance concrete bar supports as supplied by Con Sys Inc., Pinawa, MB, Canada.

2.03 FABRICATION

- A. Follow CRSI Manual of Standard Practice.
- B. Bend bars cold.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
- B. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.
- C. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

3.02 INSTALLATION

- A. Bundle or space bars, instead of field bending where construction access through reinforcing is necessary.
- B. Spacing and Positioning: Conform to ACI 318.
- C. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars".
- D. Splicing:
 - 1. Follow ACI 318.
 - 2. Use lap splices, unless otherwise shown or permitted in writing by Engineer.
 - 3. Stagger splices in adjacent bars where indicated.
- E. Mechanical Splices and Connections:
 - 1. Use only in areas specifically approved in writing by Engineer.
 - 2. Install threaded rods as recommended by manufacturer with threads totally engaged into coupling sleeve and in accordance with ICC Evaluation Services Report or equivalent code agency report.
 - 3. For metal sleeve splice, follow manufacturer's installation recommendations.
 - 4. Maintain minimum edge distance and concrete cover.
- F. Tying Reinforcing Bars:
 - 1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
 - 2. Bend tie wire away from concrete surface to provide clearance of 1 inch from surface of concrete to tie wire.
- G. Reinforcement Around Openings: On each side and above and below pipe or opening, place an equivalent area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.
- H. Straightening and Rebending: Field bending of reinforcing steel bars is not permitted.
- I. Unless permitted by Engineer, do not cut reinforcing bars in field.

3.03 TESTS AND INSPECTION

- A. An independent testing agency will be retained by Owner to inspect each mechanical splice and verify each component is installed in accordance with manufacturer's instructions and ICC Evaluation Services Report or equivalent code agency report.
- B. Special inspection will be provided by Owner as indicated on Drawings.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this Section:

1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 301, Specifications for Structural Concrete.
 - c. 305.1, Specification for Hot Weather Concreting.
 - d. 306.1, Standard Specification for Cold Weather Concreting.
 - e. 350.1, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures.
 - f. CP-1, Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1.
2. ASTM International (ASTM):
 - a. C31/C31M, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C33/C33M, Standard Specification for Concrete Aggregates.
 - c. C39/C39M, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - e. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - f. C143/C143M, Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - g. C150/C150M, Standard Specification for Portland Cement.
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C227, Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
 - j. C231/C231M, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - k. C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - l. C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
 - m. C595/C595M, Standard Specification for Blended Hydraulic Cements.

- n. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- o. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- p. C979/C979M, Standard Specification for Pigments for Integrally Colored Concrete.
- q. C989, Standard Specification for Slag Cement for Use in Concrete and Mortars.
- r. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
- s. C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- t. C1074, Standard Practice for Estimating Concrete Strength by the Maturity Method.
- u. C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- v. C1218/C1218M, Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
- w. C1240, Standard Specification for Silica Fume Used in Cementitious Mixtures.
- x. C1260, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
- y. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
- z. C1567, Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
- aa. C1582/C1582M, Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.
- bb. C1602/C1602M, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- cc. D4580, Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding.
- dd. E329, Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
- ee. E1155, Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

3. National Ready Mixed Concrete Association (NRMCA).

1.02 DEFINITIONS

- A. Cold Weather: When ambient temperature is below 40 degrees F or is approaching 40 degrees F and falling.

- B. Contractor's Licensed Design Engineer: Individual representing Contractor who is licensed to practice engineering as defined by statutory requirements of professional licensing laws in the State of Washington.
- C. Defective Area: Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch in diameter, cracks in liquid containment structures and below grade habitable spaces that are 0.005-inch wide and wider, and cracks in other structures that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include but are not limited to fins, form pop-outs, and other projections. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning.
- D. Exposed Concrete: Concrete surface that can be seen inside or outside of structure regardless of whether concrete is above water, dry at all times, or can be seen when structure is drained.
- E. Hot Weather: As defined in ACI 305.1.
- F. Hydraulic Structure: Liquid containment structure.
- G. New Concrete: Less than 60 days old.
- H. Slurry Mixture: Mixture of sand, 3/8-inch maximum nominal aggregate size, cement, and water for wall construction joints with waterstop.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Mix Designs:
 - a. Contain proportions of materials and admixtures to be used on Project, signed by mix designer.
 - b. Documentation of average strength for each proposed mix design in accordance with ACI 301.
 - c. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, for the following:
 - 1) Portland cement.
 - 2) Fly ash.
 - 3) Aggregates, including specified class designation for coarse aggregate.
 - 4) Admixtures.

- 5) Concrete producer has verified compatibility of constituent materials in design mix.
- d. Test Reports:
 - 1) Water-Soluble Chloride-Ion Content in Hardened Concrete: Unless otherwise permitted, in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
 - 2) Shrinkage Test Results: In accordance with ASTM C157/C157M as modified herein.
- e. Aggregates:
 - 1) Coarse Aggregate Gradation: List gradings and percent passing through each sieve.
 - 2) Fine Aggregate Gradation: List gradings and percent passing through each sieve.
 - 3) Combined gradation for coarse and fine aggregates. List gradings and percent passing through each sieve.
 - 4) Deleterious substances in fine aggregate per ASTM C33/C33M, Table 2.
 - 5) Deleterious substances in coarse aggregate per ASTM C33/C33M, Table 4.
 - 6) Test Reports:
 - a) Alkali Aggregate Reactivity: Aggregate shall be classified as nonpotentially reactive in accordance with Article Concrete Mix Design. Include documentation of test results per applicable standards.
- f. Admixtures: Manufacturer's catalog cut sheets and product data sheets for each admixture used in proposed mix designs.
2. Product Data: Specified ancillary materials.
3. Detailed plan for curing and protection of concrete placed and cured in cold weather. Details shall include, but not be limited to, the following:
 - a. Procedures for protecting subgrade from frost and accumulation of ice or snow on reinforcement, other metallic embeds, and forms prior to placement.
 - b. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - c. Methods for temperature protection during placement.
 - d. Types of covering, insulation, housing, or heating to be provided.
 - e. Curing methods to be used during and following protection period.
 - f. Use of strength accelerating admixtures.
 - g. Methods for verification of in-place strength.
 - h. Procedures for measuring and recording concrete temperatures.
 - i. Procedures for preventing drying during dry, windy conditions.

4. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F. Plan shall include, but not be limited to, the following:
 - a. Procedures for measuring, and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - b. Use of retarding admixture.
 - c. Methods for controlling temperature of reinforcement and other embedded items and concrete materials before and during placement.
 - d. Types of shading and wind protection to be provided.
 - e. Curing methods, including use of evaporation retardant.
 - f. Procedures for measuring and recording concrete temperatures.
 - g. Procedures for preventing drying during dry, windy conditions.

B. Informational Submittals:

1. Preinstallation Conference minutes.
2. Manufacturer's application instructions for bonding agent and bond breaker.
3. Manufacturer's Certificate of Compliance to specified standards:
 - a. Bonding agent.
 - b. Bond breaker.
4. Statement of Qualification:
 - a. Batch Plant: Certification as specified herein.
 - b. Mix designer.
 - c. Installer.
 - d. Testing agency.
5. Field test reports.
6. Concrete Delivery Tickets:
 - a. For each batch of concrete before unloading at Site.
 - b. In accordance with ASTM C94/C94M, including requirements 14.2.1. through 14.2.10.
 - c. Indicate amount of mixing water withheld and maximum amount that may be permitted to be added at Site.

1.04 QUALITY ASSURANCE

- A. Concrete construction shall conform to requirements of ACI 117 and ACI 301, except as modified herein.
- B. Qualifications:
 1. Batch Plant: NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.

2. Mix Designer: Person responsible for developing concrete mixture proportions certified as NRMCA Concrete Technologist Level 2 or DOT certified mix designer in jurisdiction of the Work. Requirement may be waived if individual is Contractor's Licensed Design Engineer.
3. Testing Agency: Unless otherwise permitted, an independent agency, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - a. Where field testing is required of Contractor, personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Preinstallation Conference:

1. Required Meeting Attendees:
 - a. Contractor, including pumping, placing and finishing, and curing subcontractors.
 - b. Ready-mix producer.
 - c. Admixture representative.
 - d. Testing and sampling personnel.
 - e. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.
3. Agenda shall include:
 - a. Admixture types, dosage, performance, and redosing at Site.
 - b. Mix designs, test of mixes, and Submittals.
 - c. Placement methods, techniques, equipment, consolidation, and form pressures.
 - d. Slump and placement time to maintain slump.
 - e. Finish, curing, and water retention.
 - f. Protection procedures for weather conditions.
 - g. Other specified requirements requiring coordination.
4. Conference minutes as specified in Section 01 31 19, Project Meetings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cementitious Materials:

1. Cement:
 - a. Portland Cement: Unless otherwise specified, conform to requirements of ASTM C150/C150M.
 - b. Blended Hydraulic Cement:
 - 1) Unless otherwise specified, conform to requirements of ASTM C595/C595M.
 - 2) Portland cement used in blended hydraulic cement, conform to requirements of ASTM C150/C150M.
 - c. Furnish from one source.
2. Supplementary Cementitious Materials (SCM):
 - a. Fly Ash (Pozzolan): Class F and Class C fly ash in accordance with ASTM C618, except as modified herein:
 - 1) ASTM C618, Table 1, Loss on Ignition: Unless permitted otherwise, maximum 3 percent.

B. Aggregates: Furnish from one source for each aggregate type used in a mix design.

1. Normal-Weight Aggregates:
 - a. In accordance with ASTM C33/C33M, except as modified herein.
 - 1) Class Designation: 4S unless otherwise specified.
 - b. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
 - c. Alkali Silica Reactivity: See Article Concrete Mix Design.
2. Fine Aggregates:
 - a. Clean, sharp, natural sand.
 - b. ASTM C33/C33M.
 - c. Limit deleterious substances in accordance with ASTM C33/C33M, Table 2 and as follows:
 - 1) Limit material finer than 75- μ m (No. 200) sieve to 3 percent mass of total sample.
 - 2) Limit coal and lignite to 0.5 percent.
3. Coarse Aggregate:
 - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
 - b. Limit deleterious substances in accordance with ASTM C33/C33M, Table 4 for specified class designation.

- C. Admixtures: Unless otherwise permitted, furnish from one manufacturer.
1. Characteristics:
 - a. Compatible with other constituents in mix.
 - b. Contain at most, only trace amount chlorides in solution.
 - c. Furnish type of admixture as recommended by manufacturer for anticipated temperature ranges.
 2. Air-Entraining Admixture: ASTM C260/C260M.
 3. Water-Reducing Admixture: ASTM C494/C494M, Type A or Type D.
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Pozzolith Series or PolyHeed Series.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon Series.
 - 3) W. R. Grace & Co., Cambridge, MA; Daracem Series or Mira Series.
 4. Retarding Admixture: ASTM C 494/C 494M, Type B.
 5. Accelerating Admixture: ASTM C 494/C 494M, Type C.
 6. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F or Type G.
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Glenium Series, PS 1460, or Rheobuild 1000.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon Series or Plastol Series.
 - 3) W. R. Grace & Co., Cambridge, MA; ADVA Series, Daracem Series, or EXP 950.
 7. Do not use calcium chloride as an admixture.
 8. Admixtures with no standard, ASTM or other, designation may be used where permitted.
- D. Water and Ice: Mixing water for concrete and water used to make ice shall be potable water, unless alternative sources of water are permitted.
1. Water from alternative sources shall comply with requirements of ASTM C1602/C1602M, and concentration of chemicals in combined mixing water shall be less than:
 - a. Chloride Content: 1,000 ppm.
 - b. Sulfate Content as SO_4 : 3,000 ppm.
 - c. Alkalis as $(\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O})$: 600 ppm.
 - d. Total Solids by Mass: Less than 50,000 ppm.

2.02 ANCILLARY MATERIALS

- A. Bonding Agent: Unless otherwise specified, in accordance with the following:
1. ASTM C881/C881M, Type V.

2. Two-component, moisture insensitive, 100 percent solids epoxy.
3. Consult manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
4. Manufacturers and Products:
 - a. BASF Building Systems Inc., Shakopee, MN; Concrevice Standard LVI.
 - b. Euclid Chemical Co., Cleveland, OH; Euco # 352 Epoxy System LV.
 - c. Prime Resins, Conyers, GA; Prime Bond 3000 to 3900 Series.
 - d. Sika Chemical Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod.

B. Bond Breaker:

1. Nonstaining type, providing positive bond prevention.
2. Manufacturers and Products:
 - a. Dayton Superior Corporation, Kansas City, KS; EDOCO Clean Lift Bond Breaker.
 - b. Nox-Crete Products Group, Omaha, NE; Silcoseal Select.

C. Repair Material:

1. In accordance with requirements of Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
2. In accordance with requirements of Section 03 01 33, Repair of Horizontal Concrete Surfaces.

D. Crack Repair: In accordance with requirements of Section 03 64 23, Crack Repair Epoxy Injection Grouting.

2.03 CONCRETE MIX DESIGN

A. General:

1. See Supplement at the end of this Section for mix design requirements for each class of concrete used on Project.
2. Prepare design mixtures for each type and strength of concrete, selecting and proportioning ingredients in accordance with requirements of ACI 301, unless otherwise specified.
3. Selection of constituent materials and products in mix design are optional, unless specified otherwise.
4. Use water-reducing admixture or water-reducing admixture and high-range, water-reducing admixture in pumped concrete.
5. Use water-reducing admixture and high-range, water-reducing admixture in columns, piers, pilasters, and walls.

6. Use water-reducing admixture or high-range, water-reducing admixture to achieve fresh properties that facilitate handling, placing, and consolidating of concrete, and specified hardened properties.
7. Use water-reducing and retarding admixture when anticipated high temperatures, low humidity, or other adverse placement conditions can adversely affect fresh properties of concrete.
8. Unless otherwise specified, desired fresh properties of concrete shall be determined by Contractor, and coordinated with concrete producer. Fresh properties of concrete shall remain stable to satisfaction of Contractor, for duration of placement and consolidation, and shall remain in conformance with requirements of Contract Documents.

B. Potential alkali-aggregate reactivity of concrete:

1. Do not use aggregates known to be susceptible to alkali-carbonate reaction (ACR).
2. Aggregates shall have been tested to determine potential alkali-aggregate reactivity in concrete in accordance with ASTM C1260 or ASTM C1567.
 - a. Aggregates that indicate expansion greater than 0.10 percent at 16 days after casting shall not be used unless they have been shown to be nondeleteriously reactive in accordance with ASTM C227 or ASTM C1293, with less than 0.04 percent expansion at 1 year for cement-aggregate combinations or less than 0.04 percent expansion at 2 years for combinations with pozzolan or slag.
 - b. Alkali content of cement used in proposed concrete mixture shall not be greater than alkali content of cement used in test for potential alkali-aggregate reactivity.
 - c. Use low-alkali cement or incorporate pozzolans into concrete mixture as necessary to satisfy testing for potential alkali reactivity.

C. Proportions:

1. Design mix to meet aesthetic, durability, and strength requirements.
2. Where fly ash is included in mix, minimum fly ash content shall be a minimum of 15 percent of weight of total cementitious materials.

D. Concrete Shrinkage Limits: Where shrinkage limits are specified, design mix for following shrinkage limits and test in accordance with ASTM C157/C157M, with the following modifications:

1. Prisms shall be moist cured for 7 days prior to 28-day drying period.
2. Comparator reading at end of 7-day moist cure shall be used as initial length in length change calculation.

3. Reported results shall be average of three prisms.
4. If shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.
5. Unless otherwise specified, results at end of 28-day drying period shall not exceed 0.040 percent if 3-inch prisms are used, or exceed 0.038 percent if 4-inch prisms are used. Aggregate will be rejected if test values exceed these limits.

E. Slump Range at Site:

1. Unless otherwise permitted, target slump value is 4 inches at point of delivery, for concrete without high-range, water reducing admixture.
2. Design mixes that include a high-range, water-reducing admixture shall have a minimum slump of 2 inches prior to addition of admixture. Slump shall be 8 inches maximum at point of delivery, for concrete with a high-range, water-reducing admixture.
3. Slump tolerance shall meet requirements of ACI 117.

F. Combined Aggregate Gradation:

1. Combined Gradation Limits: Limits shown are for coarse aggregates and fine aggregates mixed together (combined). Select one of the gradations shown in the following table:

Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
2"	100	-	-
1-1/2"	95 - 100	100	-
1"	65 - 85	90 - 100	100
3/4"	55 - 75	70 - 90	92 - 100
1/2"	-	-	68 - 86
3/8"	40 - 55	45 - 65	57 - 74
No. 4	30 - 45	31 - 47	38 - 57
No. 8	23 - 38	23 - 40	28 - 46
No. 16	16 - 30	17 - 35	20 - 36
No. 30	10 - 20	10 - 23	14 - 25
No. 50	4 - 10	2 - 10	5 - 14
No. 100	0 - 3	0 - 3	0 - 5

Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
No. 200	0 - 2	0 - 2	0 - 2

2.04 CONCRETE MIXING

- A. General: In accordance with ACI 301, except as modified herein.
- B. Truck Mixers:
 - 1. For every truck, test slump of samples taken per ASTM C94/C94M, Paragraph 12.5.1.
 - 2. Where specified slump is more than 4 inches, and if slump tests differ by more than 2 inches, discontinue use of truck mixer, unless causing condition is corrected and satisfactory performance is verified by additional slump tests.

2.05 SOURCE QUALITY CONTROL

- A. Source Quality Control Inspection: Engineer shall have access to and have right to inspect batch plants, cement mills, and supply facilities of suppliers, manufacturers, and Subcontractors, providing products included in this Section.

PART 3 EXECUTION

3.01 PLACING CONCRETE

- A. Preparation: Meet requirements ACI 301, except as modified herein.
- B. Inspection: Notify Engineer and Special Inspector at least 1 full working day in advance before starting to place concrete.
- C. Placement into Formwork:
 - 1. Reinforcement: Secure in position before placing concrete.
 - 2. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 1.5 feet deep, except for slabs which shall be placed full depth. Place and consolidate successive layers prior to initial set of first layer to prevent cold joints.
 - 3. Placement frequency shall be such that lift lines will not be visible in exposed concrete finishes.

4. Use placement devices, for example chutes, pouring spouts, and pumps as required to prevent segregation.
5. Vertical Free Fall Drop to Final Placement:
 - a. Forms 8 Inches or Less Wide: 5 feet.
 - b. Forms Wider than 8 Inches: 8 feet, except as specified.
6. For placements where drops are greater than specified, use placement device such that free fall below placement device conforms to required value.
 - a. Limit free fall to prevent segregation caused by aggregates hitting steel reinforcement.
7. Do not use aluminum conveying devices.
8. Provide sufficient illumination in the interior of forms so concrete deposition is visible, permitting confirmation of consolidation quality.
9. Joints in Footings and Slabs:
 - a. Ensure space beneath plastic waterstop completely fills with concrete.
 - b. During concrete placement, make visual inspection of entire waterstop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, and place remaining concrete to full height of slab.
 - d. Apply procedure to full length of waterstop.
10. Trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.
11. Cure concrete as specified in Section 03 39 00, Concrete Curing.

D. Conveyor Belts and Chutes:

1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system for concrete to pass without becoming segregated.
2. Do not use chutes longer than 50 feet.
3. Minimum Slopes of Chutes: Angled to allow concrete to readily flow without segregation.
4. Conveyor Belts:
 - a. Approved by Engineer.
 - b. Wipe clean with device that does not allow mortar to adhere to belt.
 - c. Cover conveyor belts and chutes.

E. Retempering: Not permitted for concrete where cement has partially hydrated.

F. Pumping of Concrete:

1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to ensure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
3. Replace pumping equipment and hoses (conduits) that are not functioning properly.

G. Maximum Size of Concrete Placements:

1. Limit size of each placement to allow for strength gain and volume change as a result of shrinkage.
2. Locate control and contraction joints where shown on Drawings.
3. Construction Joints: Unless otherwise shown or permitted, locate construction joints as follows:
 - a. Locate construction joints as shown on Drawings or where approved in joint location submittal required in Section 03 15 00, Concrete Joints and Accessories.
 - b. Uniformly space vertical construction joints within straight sections of walls and slabs, avoiding penetrations.
4. Consider beams, girders, brackets, column capitals, and haunches as part of floor or roof system and place monolithically with floor or roof system.
5. Should placement sequence result in cold joint located below finished water surface, install waterstop in joint.

H. Minimum Time between Adjacent Placements:

1. Construction or Control Joints: 7 days unless otherwise specified.
2. Construction joint between top of footing or slab, and column or wall: As soon as can safely be done without damaging previously cast concrete or interrupting curing thereof, but not less than 24 hours.
3. Contraction Joints: 1 day.
4. For columns and walls with a height in excess of 10 feet, wait at least 2 hours before depositing concrete in beams, girders, or slabs supported thereon.
5. For columns and walls 10 feet in height or less, wait at least 1 hour prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.

I. Consolidation and Visual Observation:

1. Consolidation Equipment and Methods: ACI 301.

2. Provide at least one standby vibrator in operable condition at Site prior to placing concrete.
3. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete.
4. Vibrate concrete in vicinity of joints to obtain impervious concrete.

J. Hot Weather:

1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 301, ACI 305.1, and as follows:
 - a. Maintain concrete temperature below 95 degrees F at time of placement, or furnish test data or other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking as a result of heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
 - b. Provide for windbreaks, shading, fog spraying, sprinkling, ice, wet cover, or other means as necessary to maintain concrete at or below specified temperature.
2. Concrete Curing: As specified in Section 03 39 00, Concrete Curing.

K. Cold Weather Placement:

1. Unless otherwise permitted, shall be in accordance with requirements of ACI 306.1 and as follows:
 - a. Cold weather requirements shall apply when ambient temperature is below 40 degrees F or approaching 40 degrees F and falling.
 - b. Do not place concrete over frozen earth or against surfaces with frost or ice present. Frozen earth shall be thawed to acceptance of Engineer.
 - c. Unless otherwise permitted, do not place concrete in contact with surfaces less than 35 degrees F; requirement is applicable to all surfaces including reinforcement and other embedded items.
 - d. Provide supplemental external heat as needed when other means of thermal protection are unable to maintain minimum surface temperature of concrete as specified in ACI 306.1.
 - e. Maintain minimum surface temperature of concrete as specified in ACI 306.1 for no less than 3 days during cold weather conditions.
 - f. Cure concrete as specified in Section 03 39 00, Concrete Curing.
 - 1) Protect concrete from freezing until end of curing period and until concrete has attained a compressive strength of 3,500 psi or design compressive strength if less than 3,500 psi.
2. Provide maximum and minimum temperature sensors placed on concrete surfaces spaced throughout Work to allow monitoring of

concrete surface temperatures representative of Work. Unless otherwise permitted, record surface temperature of concrete at least once every 12 hours during specified curing period.

3. External Heating Units: Do not exhaust heater flue gases directly into enclosed area as it causes concrete carbonation as a result of concentrated carbon dioxide.
4. Maintain curing conditions as specified in Section 03 39 00, Concrete Curing.

3.02 CONCRETE BONDING

- A. Construction Joints in New Concrete Members: Prepare surface of construction joint as specified in Section 03 15 00, Concrete Joints and Accessories.
- B. Construction Joints at Existing Concrete:
 1. Thoroughly clean and mechanically roughen existing concrete surfaces to roughness profile of 1/4 inch.
 2. Saturate surface with water for 24 hours prior to placing new concrete.

3.03 REPAIRING CONCRETE

- A. General:
 1. Inject cracks that leak with crack repair epoxy as specified in Section 03 64 23, Crack Repair Epoxy Injection Grouting.
 2. Repair defective areas of concrete.
 3. Repair horizontal concrete surfaces in accordance with Section 03 01 33, Repair of Horizontal Concrete Surfaces.
 4. Repair vertical and overhead concrete surfaces in accordance with Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
 5. Develop repair techniques with material manufacturer on surface that will not be visible in final construction prior to starting actual repair work and show how finish color will blend with adjacent surfaces. Obtain approval from Engineer.
 6. Obtain quantities of repair material and manufacturer's detailed instructions for use to provide repair with finish to match adjacent surface or apply sufficient repair material adjacent to repair to blend finish appearance.
 7. Repair of concrete shall provide structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

- B. Tie Holes: Unless otherwise specified, fill with specified repair material.
 - 1. Prepare substrate and mix, place, and cure repair material per manufacturer's written recommendations.
- C. Alternate Form Ties, Through-Bolts:
 - 1. Mechanically roughen entire interior surface of through hole.
 - 2. Apply bonding agent to roughened surface and drive elastic vinyl plug to half depth.
 - 3. Dry pack entire hole from both sides of plug with nonshrink grout, as specified in Section 03 62 00, Nonshrink Grouting.
 - 4. Use only enough water to dry pack grout.
 - 5. Dry pack while bonding agent is still tacky.
 - 6. If bonding agent has dried, remove bonding agent by mechanical means and reapply new coat of bonding agent.
 - 7. Compact grout using steel hammer and steel tool to drive grout to high density.
 - 8. Cure grout with water.
- D. Exposed Metal Objects:
 - 1. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to depth of 1 inch and then cutting or removing metal object.
 - 2. Repair area of chipped-out concrete as specified for defective areas.
- E. Blockouts at Pipes or Other Penetrations: Where shown install in accordance with requirements of Drawings.

3.04 CONCRETE WALL FINISHES

- A. Type W-1 (Ordinary Wall Finish):
 - 1. Patch tie holes.
 - 2. Knock off projections.
 - 3. Repair defective areas.
 - 4. Inject cracks in accordance with requirements of Section 03 64 23, Crack Repair Epoxy Injection Grouting.
- B. Type W-2 (Smooth Wall Finish):
 - 1. Patch tie holes.
 - 2. Grind off fins and other projections.
 - 3. Repair defective areas to provide smooth uniform appearance.
 - 4. Inject cracks in accordance with requirements of Section 03 64 23, Crack Repair Epoxy Injection Grouting.

3.05 CONCRETE SLAB FINISHES

A. General:

1. Use manual screeds, vibrating screeds, or roller compacting screeds to place concrete level and smooth.
2. Do not use “jitterbugs” or other special tools designed for purpose of forcing coarse aggregate away from surface and allowing layer of mortar, which will be weak and cause surface cracks or delamination, to accumulate.
3. Finish slab in accordance with specified slab finish.
4. Do not dust surfaces with dry materials nor add water to surfaces.
5. Cure concrete as specified in Section 03 39 00, Concrete Curing.

B. Type S-1 (Steel Troweled Finish):

1. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation.
2. Wood float to true, even plane with no coarse aggregate visible.
3. Use sufficient pressure on wood floats to bring moisture to surface.
4. After surface moisture has disappeared, hand steel trowel concrete to produce smooth, smooth dense surface, free from trowel marks.
5. Provide light steel-troweled finish (two trowelings) at air-entrained slabs. Provide hard steel-troweled finish (ringing sound from the trowel) for nonair-entrained slabs.
6. Do not use dry cement or additional water during troweling, nor will excessive troweling be permitted.
7. Power Finishing:
 - a. Approved power machine may be used in lieu of or in addition to hand finishing in accordance with directions of machine manufacturer.
 - b. Do not use power machine when concrete has not attained necessary set to allow finishing without introducing high and low spots in slab.
 - c. Do first steel troweling for slab S-1 finish by hand.

C. Type S-2 (Wood Float Finish):

1. Finish slab to receive fill and mortar setting bed by screeding with straightedges to bring surface to required finish plane.
2. Wood float finish to compact and seal surface.
3. Remove laitance and leave surface clean.
4. Coordinate with other finish procedures.

- D. Type S-3 (Underside Elevated Slab Finish): When forming is removed, grind off projections on underside of slab and repair defective areas, including small shallow air pockets where schedule of concrete finishes requires:
1. Prepare surfaces to match Type W-2 (Smooth Wall Finish).
- E. Type S-5 (Broomed Finish):
1. Finish as specified for Type S-1 floor finish, except use only a light-steel troweled finish, and then finish surface by drawing fine-hair broom lightly across surface.
 2. Broom in same direction and parallel to expansion joints, or, in case of inclined slabs, perpendicular to slope, except for round roof slab, broom surface in radial direction.
- F. Type S-6 (Sidewalk Finish):
1. Slope walks down 1/4 inch per foot away from structures, unless otherwise shown.
 2. Strike off surface by means of strike board and float with wood or cork float to true plane, then flat steel trowel before brooming.
 3. Broom surface at right angles to direction of traffic or as shown.
 4. Lay out sidewalk surfaces in blocks, as shown or as directed by Engineer, with grooving tool.
- G. Concrete Curbs:
1. Float top surface of curb smooth, and finish all discontinuous edges with steel edger.
 2. After concrete has taken its initial set, remove front form and give exposed vertical surface an ordinary wall finish, Type W-1.

3.06 CONCRETE SLAB TOLERANCES

- A. Slab Tolerances:
1. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
 2. Slab Finish Tolerances and Slope Tolerances: Crowns on floor surface not too high as to prevent 10-foot straightedge from resting on end blocks, nor low spots that allow block of twice the tolerance in thickness to pass under supported 10-foot straightedge.
 3. Slab Type S-A: Steel gauge block 5/16-inch thick.
 4. Slab Type S-B: Steel gauge block 1/8-inch thick.
 5. Slab Type S-A and S-B: Finish Slab Elevation: Slope slabs to floor drain and gutter, and shall adequately drain regardless of tolerances.

6. Thickness: Maximum 1/4-inch minus or 1/2 inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.

B. Slab Elevation and Thickness:

1. Finish Slab Elevation: Slope slabs to floor drains and gutter. Slabs shall adequately drain regardless of tolerances.
2. Thickness: Maximum 1/4-inch minus or 1/2-inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2-inch plus.

3.07 BEAM AND COLUMN FINISHES

A. Type B-1: Match wall Type W-1.

B. Type B-2: Match wall Type W-2.

3.08 BACKFILL AGAINST STRUCTURES

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.
- B. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

3.09 FIELD QUALITY CONTROL

A. General:

1. Provide adequate facilities for safe storage and proper curing of concrete test specimens onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
2. Unless otherwise specified, sample concrete for testing for making test specimens, from point of delivery.
3. When concrete is pumped, sample and test air content at point of delivery and at point of placement.
 - a. For Each Concrete Mixture: Provided results of air content tests for first load of the day are within specified limits, testing need only be performed at point of delivery for subsequent loads of that concrete mixture except that testing should be performed at point of placement every 4 hours.
4. Evaluation will be in accordance with ACI 301 and Specifications.
5. Test specimens shall be made, cured, and tested in accordance with ASTM C31/C31M and ASTM C39/C39M.
6. Frequency of testing may be changed at discretion of Engineer.

7. Pumped Concrete: Take concrete samples for slump, ASTM C143/C143M, and test specimens, ASTM C31/C31M and ASTM C39/C39M, and shrinkage specimens (ASTM C157/C157M) at placement (discharge) end of line.
8. If measured air content at delivery is greater than specified limit, check test of air content will be performed immediately on a new sample from delivery unit. If check test fails, concrete has failed to meet requirements of Contract Documents. If measured air content is less than lower specified limit, adjustments will be permitted in accordance with ASTM C94/C94M, unless otherwise specified. If check test of adjusted mixture fails, concrete has failed to meet requirements of Contract Documents. Concrete that has failed to meet requirements of Contract Documents shall be rejected.

B. Concrete Strength Test:

1. Unless otherwise specified, one specimen at age of 7 days for information, and two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 28 days for acceptance.
2. Concrete with specified 56-day strength, test one specimen at age of 7 days for information, two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 28 days for acceptance, and two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 56 days for acceptance. Should results of 28-day tests meet specified requirement for 56-day strength, 56-day tests will not be required.
3. Provide a minimum of one spare test specimen per sample. Test spare cylinder as directed by Engineer.

C. Shrinkage Tests:

1. When required to conform to shrinkage limits, collect actual concrete materials being batched and before liquids have been added to mix.
2. Mix sampled material in a laboratory at proportions matching batched concrete.
3. Test shrinkage characteristics every 5,000 cubic yards of concrete used on job and every 3 months during construction when compression test cylinders are made.
4. Concrete Shrinkage Limits: Test in accordance with ASTM C157/C157M, with the following modifications:
 - a. Prisms shall be moist cured for 7 days prior to 28-day drying period.
 - b. Comparator reading at end of 7-day moist cure shall be used as initial length in length change calculation.
 - c. Reported results shall be average of three prisms.

- d. If drying shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.
- e. Results at end of 28-day drying period shall not exceed 0.040 percent if 3-inch prisms are used, or exceed 0.038 percent if 4-inch prisms are used.
- f. If 7-day or 14-day shrinkage tests results exceed shrinkage limits established by design mix testing, furnish additional 14 days of water curing beyond original curing period, for concrete surfaces of hydraulic structures represented by prisms. Modify concrete mix design to reduce shrinkage prior to casting additional concrete on Project.

D. High-Range, Water-Reducer (Superplasticizer) Admixture Segregation Test: Test each truck prior to use on Project.

- 1. Segregation Test Objective: Concrete with 4-inch to 8-inch slump shall stay together when slumped. Segregation is assumed to cause mortar to flow out of mix even though aggregate may stay piled enough to meet slump test.
- 2. Test Procedure: Make slump test and check for excessive slump and observe to see if mortar or moisture flows from slumped concrete.
- 3. Reject concrete if mortar or moisture separates and flows out of mix.

E. Cold Weather Placement Tests:

- 1. During cold weather concreting, cast cylinders for field curing as follows. Use method that will produce greater number of specimens:
 - a. Six extra test cylinders from last 100 cubic yards of concrete.
 - b. Minimum three specimens for each 2 hours of placing time or for each 100 cubic yards.
- 2. These specimens shall be in addition to those cast for lab testing.
- 3. Protect test cylinders from weather until they can be placed under same protection provided for concrete of structure that they represent.
- 4. Keep field test cylinders in same protective environment as parts of structure they represent to determine if specified strength has been obtained.
- 5. Test cylinders in accordance with applicable sections of ASTM C31/C31M and ASTM C39/C39M.
- 6. Use test results to determine specified strength gain prior to falsework removal or for prestressing.

F. Tolerances:

- 1. Walls: Measure and inspect walls for compliance with tolerances specified in Section 03 10 00, Concrete Forming and Accessories.

2. Slab Finish Tolerances and Slope Tolerances:
 - a. Make floor flatness measurements day after floor is finished and before shoring is removed to eliminate effects of shrinkage, curing, and deflection.
 - b. Support 10-foot long straightedge at each end with steel gauge blocks of thicknesses equal to specified tolerance.
 - c. Compliance with designated limits in four of five consecutive measurements is satisfactory, unless defective conditions are observed.

3.10 MANUFACTURER'S SERVICES

- A. Provide representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection, and certification of proper installation for concrete ingredients, mix design, mixing, and placement.
 1. Concrete Producer Representative:
 - a. Observe how concrete mixes are performing.
 - b. Be present during first placement of each type of concrete mix.
 - c. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout Project, including instructions for redosing.
 - d. Establish control limits on concrete mix designs.
 - e. Provide equipment for control of concrete redosing for air entrainment or high-range, water-reducing admixture, superplasticizers, at Site to maintain proper slump and air content if needed.
 2. Admixture Manufacturer's Representative: Available for consultations as required to ensure proper installation and performance of specified products.
 3. Bonding Agent Manufacturer's Representative: Available for consultations as required to ensure proper installation and performance of specified products.

3.11 PROTECTION OF INSTALLED WORK

- A. After curing as specified in Section 03 39 00, Concrete Curing, and after applying final floor finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep floor clean and protect it from material and damage as a result of other construction work.
- B. Repair areas damaged by construction, using specified repair materials and approved repair methods.

3.12 SCHEDULE OF CONCRETE FINISHES

- A. Form Tolerances: As specified in Section 03 10 00, Concrete Forming and Accessories.
- B. Special Floor Finishes: As specified in Section 03 35 00, Concrete Finishing.
- C. Provide concrete finishes as scheduled:

Area	Type of Finish	Required Form Tolerances
Exterior Wall Surfaces		
Abovegrade/exposed (above point 6" below finish grade)	W-2	W-B
Backfilled/waterproofed (below point 6" below finish grade)	W-1	W-A
Backfilled/not waterproofed (below point 6" below final grade)	W-1	W-A
Interior Wall Surfaces		
Buildings and other dry areas/not painted or coated	W-2	W-A
Exterior Slabs		
Top of footing	S-2	S-A
Stairs and landings	S-5	S-B
Sidewalks	S-6	S-B
Other exterior slabs	S-5	S-A
Interior Slabs		
Buildings, pipe galleries, and other dry areas	S-5	S-B
Underside of elevated slabs	S-3	S-A
Beams and Columns		
Beams/coated	B-3	B-A

3.13 SUPPLEMENTS

A. Requirements of concrete mix designs following “End of Section,” are a part of this Specification and supplement requirements of Part 1 through Part 3 of this Section:

1. Concrete Mix Design, Class 6000F3S1P2C2 and 5000F3S1P2C2.
2. Concrete Mix Design, Class 4500F1S1P0C1.
3. Concrete Mix Design, Class 4500F3S1P1C2.

END OF SECTION

CONCRETE MIX DESIGN, CLASS 6000F3S1P2C2 AND 5000F3S1P2C2

A. Mix Locations:

1. Typical, unless otherwise specified.

B. Exposure Categories and Classifications: F3S1P2C2.

C. Mix Properties:

1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.40.
2. Minimum concrete compressive strength (f'_c) shall be 4,500 psi at 28 days and 5,000 psi at 56 days except for the Tipping floor minimum concrete compressive strength which shall be 5,000 psi at 28 days and 6,000 psi at 56 days.
3. Designed to conform to shrinkage limits.
4. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - a. Slabs to receive hard-troweled finish.
 - b. Slabs to receive dry shake floor hardener.
 - c. Slabs to receive topping placed monolithically as two-course floor on top of plastic concrete.
5. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5
2§	5.0

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
3§	4.5
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent. §Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on the sieved fraction passing the 1-1/2-inch sieve in accordance with ASTM C231/C231M.	

6. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 25 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
7. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II; inclusion of supplementary cementitious materials in design mix is optional.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - c. ASTM C595/C595M Type IP, tested to comply with moderate sulfate resistance option (MS).
 - 1) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
8. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 515 pounds per cubic yard for concrete with 1-1/2-inch nominal maximum size aggregate.

- b. 535 pounds per cubic yard for 1-inch nominal maximum size aggregate.
 - c. 560 pounds per cubic yard for 3/4-inch nominal maximum size aggregate.
 - d. 580 pounds per cubic yard for 1/2-inch nominal maximum size aggregate.
 - e. 600 pounds per cubic yard for 3/8-inch nominal maximum size aggregate.
 - f. Unless otherwise permitted, limit cementitious materials content to 100 pounds per cubic yard greater than specified minimum cementitious materials content in mix design.
 - 9. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent, unless otherwise specified.
 - a. Limits are stated in terms of chloride ions in percent by weight of cement.
 - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
- D. Refer to PART 1 through PART 3 of this Section for additional requirements.

CONCRETE MIX DESIGN, CLASS 4500F1S1P0C1

A. Mix Locations:

1. Duct banks.
2. Pipe encasements that are not cast monolithically with concrete base mats or slabs.
3. Where specified in Contract Documents.

B. Exposure Categories and Classifications: F1S1P0C1.

C. Mix Properties:

1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.45.
2. Minimum concrete compressive strength (f'c) shall be 3,500 psi at 28 days and 4,500 psi at 56 days.
3. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in. ‡	Air Content (%)*
3/8	6.0
1/2	5.5
3/4	5.0
1	4.5
1-1/2	4.5
2§	4.0
3§	3.5

‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.

*Tolerance of air content is +1-1/2 percent.

§Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on the sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on the sieved fraction passing the 1-1/2-inch sieve in accordance with ASTM C231/C231M.

4. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II; inclusion of supplementary cementitious materials in design mix is optional.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - 3) ASTM C595/C595M Type IP or Type IS (less than 70), tested to comply with moderate sulfate resistance option (MS).
 - a) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 5. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent, unless otherwise specified.
 - a. Limits are stated in terms of chloride ions in percent by weight of cement.
 - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
- D. Refer to PART 1 through PART 3 of this Section for additional requirements.

CONCRETE MIX DESIGN, CLASS 4500F3S1P1C2

- A. Mix Locations: Concrete curbs and sidewalks.
- B. Exposure Categories and Classifications: F3S1P1C2.
- C. Mix Properties:
 - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.42.
 - 2. Minimum concrete compressive strength (f'_c) shall be 3,500 psi at 28 days and 4,500 psi at 56 days.
 - 3. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - a. Slabs to receive hard-troweled finish.
 - b. Slabs to receive dry shake floor hardener.
 - c. Slabs to receive topping placed monolithically as two-course floor on top of plastic concrete.
 - 4. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in. ‡	Air Content (%)*
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5
2§	5.0
3§	4.5

‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.

*Tolerance of air content is +1-1/2 percent.

§Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on the sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on the sieved fraction passing the 1-1/2-inch sieve in accordance with ASTM C231/C231M.

5. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in a mix design, as follows:
 - a. Fly Ash and other Pozzolans: 25 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
6. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - c. ASTM C595/C595M Type IP or Type IS (less than 70), tested to comply with moderate sulfate resistance option (MS).
 - 1) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent, unless otherwise specified.
 - a. Limits are stated in terms of chloride ions in percent by weight of cement.
 - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.

D. Refer to PART 1 through PART 3 of this Section for additional requirements.

SECTION 03 35 00
CONCRETE FINISHING

PART 1 GENERAL

1.01 SUBMITTALS

- A. Action Submittals: Manufacturer's product data sheet(s).
- B. Informational Submittals:
 - 1. Agenda: Conference prior to slab placement.
 - 2. Manufacturer's written procedures for slab preparation, product application, protection of finished surface, and post-application cleanup.
 - 3. Product manufacturers representatives' names and phone numbers.
 - 4. Manufacturer's Certificate of Compliance for products to be furnished.
 - 5. Manufacturer's Certificate of Proper Installation.
 - 6. Statement of Qualifications:
 - a. Manufacturer's Product Service Record.
 - b. Application personnel.
 - c. Manufacturer's representative.
 - 7. Manufacturer's installation instructions.
 - 8. Manufacturer's written instructions for maintenance and repair of floor finishes installed.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer's Product Service Record: Five previous projects at least 5 years old where product was used at representative coverage per square foot.
 - 2. Floor Product Manufacturer: Manufacture components of floor material, except the epoxy, in own plant and under control of trained quality control manager.
 - 3. Application Personnel: Four previous projects of successful installation of specified materials or manufacturer's training.
- B. Preinstallation Training: Manufacturer-approved training of application personnel and quality control inspectors for these floor finishes.
- C. Conference Prior to Slab Placement:
 - 1. Conducted by Contractor.
 - 2. Agenda:
 - a. Concrete mix design.

- b. Placing techniques.
- c. Finishing techniques.
- d. Equipment required for these procedures.
- 3. Attendees:
 - a. Contractor's superintendent.
 - b. Subcontractor's representative involved in slab installation and finishing.
 - c. Engineer.

PART 2 PRODUCTS

2.01 CLEAR LIQUID SEALER DUST PROOFER

- A. Colorless, aqueous solution of zinc and magnesium fluorosilicate.
- B. Each gallon of solution shall contain a minimum of 2 pounds of fluorosilicate compound.
- C. Manufacturers:
 - 1. Master Builders Co., Cleveland, OH.
 - 2. Sonneborn, Minneapolis, MN.
 - 3. Euclid Chemical Co., Cleveland, OH.

PART 3 EXECUTION

3.01 CLEAR LIQUID SEALER DUST PROOFER APPLICATION

- A. Before application, thoroughly cure floors to receive treatment for minimum 28 days, keep clean, unpainted, free from membrane curing compounds, and perfectly dry with all Work above them completed.
- B. Apply hardener evenly to surface, using three coats, allowing 24 hours between coats.
 - 1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
 - 2. Apply each coat so as to remain wet on surfaces for 15 minutes.
 - 3. Apply approved treatment in accordance with manufacturer's instructions.
 - 4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.02 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance,

inspection and certification of proper installation, and training of application personnel.

1. Technical assistance with design and adjustment of concrete mixes to receive floor finishes and toppings.
2. Technical assistance to assure and certify application and installation of system being used.
3. Consultation, direction, and certification of mockup, for full-scale application of floor finishes, and at other times as needed.
4. Attendance at the conference prior to slab placement to finalize proper methods and procedures.

END OF SECTION

SECTION 03 39 00
CONCRETE CURING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. ASTM International (ASTM):
 - a. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - b. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.02 SUBMITTALS

A. Action Submittals:

1. Manufacturers' data indicating compliance with the requirements specified herein for the following products:
 - a. Evaporation retardant.
 - b. Curing compound.
2. Curing methods proposed for each type of element such as slab, walls, beams, and columns in each facility.

B. Informational Submittals:

1. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, for the following:
 - a. Curing compound showing moisture retention requirements.
 - b. Retardants for exposed aggregate finish.

PART 2 PRODUCTS

2.01 MATERIALS

1. Water-based, high-solids content, nonyellowing, curing compound meeting requirements of ASTM C1315, C309, Class A.
2. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee, MN; Kure 1315.
 - b. Euclid Chemical Co., Cleveland, OH; Super Diamond Clear VOX.
 - c. WR Meadows, Inc., Hampshire, IL; VOCOMP-30.
 - d. Vexcon Chemical, Inc.; Philadelphia, PA; Starseal 1315.

- e. Dayton Superior; Safe Cure and Seal 1315 EF.
- f. BASF Construction Chemicals., Shakopee, MN; Kure-N-Seal.
- g. Euclid Chemical Co., Cleveland, OH; EucoCure VOX.
- h. Euclid Chemical Co., Cleveland, OH; Kurez VOX.

B. Evaporation Retardant:

- 1. Optional: Fluorescent fugitive dye color tint that disappears completely upon drying.
- 2. Manufacturers and Products:
 - a. Master Builders Co., Cleveland, OH; Confilm.
 - b. Euclid Chemical Co., Cleveland, OH; Eucobar.

C. Clear Sealer (One-Component Penetrating Silane Sealer):

- 1. Manufacturers and Products:
 - a. Chemrex, Inc., Shakopee, MN; Masterseal SL.
 - b. Euclid Chemical Co.; Eucoguard 200.

PART 3 EXECUTION

3.01 CONCRETE CURING

A. Use one of the following methods as approved by Engineer:

- 1. Walls:
 - a. Method 1: Leave concrete forms in place and keep surfaces of forms and concrete wet for 7 days.
 - b. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.
 - c. Method 3: Apply curing compound, only where specifically allowed by the Engineer, immediately after removal of forms.
- 2. Slabs and Curbs:
 - a. Method 1: Protect surface by water ponding for 7 days.
 - b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 7 days.
 - c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 7 days.
 - d. Method 4: Continuously sprinkle exposed surface for 7 days.
 - e. Method 5: Apply curing compound, only where specifically allowed by the Engineer, immediately after final finishing when surface will no longer be damaged by traffic.

B. USP curing.

3.02 EVAPORATION RETARDANT APPLICATION

- A. Use on flatwork when environmental conditions are anticipated to cause rapid drying of the concrete surface.
- B. Spray onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture.
- C. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.03 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection, and certification of proper installation for products specified.
- B. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat.

END OF SECTION

SECTION 03 62 00
NONSHRINK GROUTING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. ASTM International (ASTM):
 - a. C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
 - b. C621, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrinkable).
 - c. C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - d. C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

1.02 SUBMITTALS

A. Action Submittals:

1. Product data of grouts.
2. Proposed method for keeping existing concrete surfaces wet prior to placing grout.
3. Forming method for fluid grout placements.
4. Curing method for grout.

B. Informational Submittals:

1. Manufacturer's Written Instructions:
 - a. Adding fiber reinforcing to batching.
 - b. Cement-water ratio of grout topping.
 - c. Mixing of grout.
2. Manufacturer's proposed training schedule for grout work.
3. Manufacturer's Certificate of Compliance:
 - a. Grout free from chlorides and other corrosion-causing chemicals.
 - b. Nonshrink grout properties of Category II and Category III, verifying expansion at 3 days or 14 days will not exceed the 28-day expansion and nonshrink properties are not based on gas or gypsum expansion.
4. Manufacturer's Certificate of Proper Installation.
5. Statements of Qualification: Nonshrink grout manufacturer's representative.

6. Test Reports:
 - a. Test report for 24-hour evaluation of nonshrink grout.
 - b. Test results and service report from demonstration and training session.
 - c. Field test reports and laboratory test results for field-drawn Samples.

1.03 QUALIFICATIONS

- A. Nonshrink Grout Manufacturer's Representative: Authorized and trained representative of grout manufacturer. Minimum of 1-year experience that has resulted in successful installation of grouts similar to those for this Project.
- B. For grout suppliers not listed herein, provide completed 24-hour Evaluation of Nonshrink Grout Test Form, attached at the end of this Section. Independent testing laboratory to certify that testing was conducted within last 18 months.

1.04 GUARANTEE

- A. Manufacturer's guarantee shall not contain disclaimer on the product data sheet, grout bag, or container limiting responsibility to only the purchase price of products and materials furnished.
- B. Manufacturer guarantees participation with Contractor in replacing or repairing grout found defective as a result of faulty materials, as determined by industry standard test methods.

PART 2 PRODUCTS

2.01 NONSHRINK GROUT SCHEDULE

- A. Furnish nonshrink grout for applications in grout category in the following schedule:

Application	Temperature Range	Max. Placing Time	
	40 deg F to 100 deg F	20 Min.	Greater Than 20 Min.
Filling tie holes	I	I	I
Machine bases 25 hp or less	II	II	II
Through-bolt openings	II	II	II

Application	Temperature Range	Max. Placing Time	
	40 deg F to 100 deg F	20 Min.	Greater Than 20 Min.
Machine bases 26 hp and up	III	III	III
Baseplates and/or soleplates with vibration, thermal movement, etc.	III	III	III

2.02 NONSHRINK GROUT

A. Category I:

1. Nonmetallic and nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Test in accordance with ASTM C1107/C1107M:
 - a. Grout shall have flowable consistency.
 - b. Flowable for 15 minutes.
4. Grout shall not bleed at maximum allowed water.
5. Minimum strength of flowable grout, 3,000 psi at 3 days, 5,000 psi at 7 days, and 7,000 psi at 28 days.
6. Manufacturers and Products:
 - a. BASF Building Systems, Inc., Shakopee, MN; Construction Grout.
 - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
 - c. Dayton Superior Corp., Kansas City, KS; 1107 Advantage Grout.
 - d. US MIX Co., Denver, CO; US Spec MP Grout.
 - e. L & M Construction Chemicals, Inc., Omaha, NE; Duragrout.

B. Category II:

1. Nonmetallic, nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
4. Test in accordance with ASTM C1107/C1107M:
 - a. Fluid consistency 20 seconds to 30 seconds in accordance with ASTM C939.
 - b. Temperatures of 40 degrees F, 80 degrees F, and 100 degrees F.
5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.

6. Minimum strength of fluid grout, 3,500 psi at 1 day, 4,500 psi at 3 days, and 7,500 psi at 28 days.
7. Maintain fluid consistency when mixed in 1 to 9 yard loads in ready-mix truck.
8. Manufacturers and Products:
 - a. BASF Building Systems, Inc., Shakopee, MN; Master Flow 928.
 - b. Five Star Products Inc., Fairfield, CT; Five Star Fluid Grout 100.
 - c. Euclid Chemical Co., Cleveland, OH; Hi Flow Grout.
 - d. Dayton Superior Corp., Kansas City, KS; Sure Grip High Performance Grout.
 - e. L & M Construction Chemicals, Inc., Omaha, NE; Crystex.

C. Category III:

1. Metallic and nongas-liberating.
2. Prepackaged aggregate grout requiring only the addition of water.
3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
4. Test in accordance with ASTM C1107/C1107M:
 - a. Fluid consistency 20 seconds to 30 seconds in accordance with ASTM C939.
 - b. Temperatures of 40 degrees F and 100 degrees F.
5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
6. Minimum strength of fluid grout, 4,000 psi at 1 day, 5,000 psi at 3 days, and 9,000 psi at 28 days.
7. Maintain fluid consistency when mixed in 1-yard to 9-yard loads in ready-mix truck.
8. Manufacturer and Product:
 - a. BASF Building Systems, Inc., Shakopee, MN; EMBECO 885.
 - b. L & M Construction Chemicals, Inc., Omaha, NE; Ferrogrout.

PART 3 EXECUTION

3.01 NONSHRINK GROUT

- A. General: Mix, place, and cure nonshrink grout in accordance with grout manufacturer's representative's training instructions.
- B. Form Tie or Through-Bolt Holes: Provide nonshrink grout, Category I and Category II, fill space with dry pack dense grout hammered in with steel tool and hammer. Through-bolt holes; coordinate dry pack dense grout application with vinyl plug in Section 03 10 00, Concrete Forming and Accessories, and bonding agent in Section 03 30 00, Cast-in-Place Concrete.

C. Grouting Machinery Foundations:

1. Block out original concrete or finish off at distance shown below bottom of machinery base with grout. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material.
2. Set machinery in position and wedge to elevation with steel wedges, or use cast-in leveling bolts.
3. Form with watertight forms at least 2 inches higher than bottom of plate.
4. Fill space between bottom of machinery base and original concrete in accordance with manufacturer's representative's training instructions.

3.02 FIELD QUALITY CONTROL

A. Evaluation and Acceptance of Nonshrink Grout:

1. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
2. Perform flow cone and bleed tests, and make three 2-inch by 2-inch cubes for each 25 cubic feet of each type of nonshrink grout used. Use restraining caps for cube molds in accordance with ASTM C1107/C1107M.
3. For large grout applications make three additional cubes and one more flow cone test. Include bleed test for each additional 25 cubic feet of nonshrink grout placed.
4. Consistency: As specified in Article Nonshrink Grout. Grout with consistencies outside range requirements shall be rejected.
5. Segregation: As specified in Article Nonshrink Grout. Grout when aggregate separates shall be rejected.
6. Nonshrink grout cubes shall test equal to or greater than minimum strength specified.
7. Strength Test Failures: Nonshrink grout work failing strength tests shall be removed and replaced.
8. Perform bleeding test to demonstrate grout will not bleed.
9. Store cubes at 70 degrees F.
10. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C1107/C1107M.

3.03 MANUFACTURER'S SERVICES

A. General:

1. Coordinate demonstrations, training sessions, and applicable Site visits with grout manufacturer's representative.

2. Provide and conduct onsite, demonstration and training sessions for bleed tests, mixing, flow cone measurement, cube testing, application, and curing for each category and type of nonshrink grout.
3. Necessary equipment and materials shall be available for demonstration.

B. Training:

1. Training is required for all Type II and Type III grout installations.
2. Grout manufacturer's representative shall train Contractor to perform grout work.
3. Establish location at Site and schedule time for grout manufacturer's demonstration and training session of proposed nonshrink grouts. Mix nonshrink grouts to required consistency, test, place, and cure on actual Project, such as, baseplates and tie holes to provide actual on-the-job training.
4. Use minimum of three bags for each grout Category II and Category III. Mix grout to fluid consistency and conduct flow cone and two bleed tests, make a minimum of six cubes for testing of two cubes at 1 day, 3 days, and 28 days. Use remaining grout for final Work.
5. Training shall include methods for curing grout.
6. Transport test cubes to independent test laboratory and obtain test reports.

3.04 SUPPLEMENT

A. The supplement listed below, following "End of Section," is part of this Specification.

1. 24-Hour Evaluation of Nonshrink Grout Test Form and Grout Testing Procedures.

END OF SECTION

SUPPLEMENT 1

(Test Lab Name)

(Address)

(Phone No.)

24-HOUR EVALUATION OF NONSHRINK GROUT TEST FORM

OBJECTIVE: Define standard set of test procedures for an independent testing laboratory to perform and complete within a 24-hour period.

SCOPE: Utilize test procedures providing 24-hour results to duplicate field grouting demands. Intent of evaluation is to establish grout manufacturer's qualifications.

PRIOR TO TEST: Obtain three bags of each type of grout.

1. From intended grout supplier for Project.
2. Three bags of grout shall be of same lot number.

ANSWER THE FOLLOWING QUESTIONS FOR GROUT BEING TESTED FROM LITERATURE, DATA, AND PRINTING ON BAG:

A.	Product data and warranty information contained in company literature and data?	Yes_____ No_____
B.	Literature and bag information meet specified requirements?	Yes_____ No_____
C.	Manufacturer guarantees grout as specified in Article Guarantee?	Yes_____ No_____
D.	Guarantee extends beyond grout replacement value and allows participation with Contractor in replacing and repairing defective areas?	Yes_____ No_____
E.	Water demands and limits printed on bag?	Yes_____ No_____
F.	Mixing information printed on the bag?	Yes_____ No_____
G.	Temperature restrictions printed on bag?	Yes_____ No_____

*Rejection of a grout will occur if one or more answers are noted NO.

GROUT TESTING PROCEDURES

A. Bagged Material:

1. List lot numbers. _____
2. List expiration date. _____
3. Weigh bags and record weight. _____

Owner's Representative will disqualify grout if bag weights have misstated measure plus or minus 2 pounds by more than one out of five bags. (Accuracy of weights is required to regulate amount of water used in mixing since this will affect properties.)

B. Mixing and Consistency Determination:

1. Mix full bag of grout in 10-gallon pail.
2. Use electric drill with a paddle device to mix grout (jiffy or jiffler type paddle).
3. Use maximum water allowed per water requirements listed in bag instructions.
4. Mix grout to maximum time listed on bag instructions.
5. In accordance with ASTM C939 (flow cone) determine time of mixed grout through the flow cone. _____ seconds
6. Add water to attain 20- to 30-second flow in accordance with ASTM C939.
7. Record time of grout through cone at new water demand. _____ seconds
8. Record total water needed to attain 20- to 30-second flow. _____ pounds
9. Record percent of water. _____ percent

C. When fluid grout is specified and additional water is required beyond grout manufacturer's listed maximum water, ASTM C1107/C1107M will be run at new water per grout ratio to determine whether grout passes using actual water requirements to be fluid. Use new water per grout ratio on remaining tests.

D. Bleed Test:

1. Fill two gallon cans half full of freshly mixed grout at ambient temperatures for each category and at required consistency for each.
2. Place one can of grout in tub of ice water and leave one can at ambient temperature.
3. Cover top of both cans with glass or plastic plate preventing evaporation.
4. Maintain 38 degrees F to 42 degrees F temperature with grout placed in ice and maintain ambient temperature for second container for 1 hour.
5. Visually check for bleeding of water at 15-minute intervals for 2 hours.
6. Perform final observation at 24 hours.

If grout bleeds a small amount at temperatures specified, grout will be rejected.

E. Extended Flow Time and Segregation Test (for Category II and Category III):

1. Divide the remaining grout into two 3-gallon cans. Place the cans into the 40-degree F and 100-degree F containers and leave for 20, 40, and 60 minutes. Every 20 minutes remove and check for segregation or settlement of aggregate. Use a gloved hand to reach to the bottom of the can, if more than 1/4-inch of aggregate has settled to the bottom or aggregate has segregated into clumps reject the grout.
2. Right after the settlement test mix the grout with the drill mixer for 10 seconds. Take a ASTM C939 flow cone test of grout and record flow time. Maintain this process for 1 hour at ambient temperatures of 40 degrees F and 100 degrees F.
 - a. 20 min _____, sec. @ 40 degrees F.
 - b. 40 min _____, sec. @ 40 degrees F.
 - c. 60 min _____, sec. @ 40 degrees F.
 - d. 20 min _____, sec. @ 100 degrees F.
 - e. 40 min _____, sec. @ 100 degrees F.
 - f. 60 min _____, sec. @ 100 degrees F.

All Category II and Category III grout that will not go through the flow cone with continuous flow after 60 minutes will be disqualified.

Qualified

Disqualified

F. 24-hour Strength Test:

1. Using grout left in mixing cans in accordance with ASTM C1107/C1107M for mixing and consistency determination test and for extended time flow test, make minimum of nine cube samples.
2. Store cubes at 70 degrees F for 24 hours.
3. Record average compressive strength of nine cubes at 24 hours.

Grout will be disqualified if 24-hour compressive strengths are less than 2,500 psi for grouts claiming fluid placement capabilities.

Grouts that have not been disqualified after these tests are qualified for use on the Project for the application indicated in Nonshrink Grout Schedule.

Signature of Independent Testing Laboratory

Date Test Conducted

SECTION 03 63 00 CONCRETE DOWELING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American National Standards Institute (ANSI).
 - 2. ASTM International (ASTM):
 - a. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - b. E488, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 - 3. International Code Council (ICC):
 - a. 2009 International Building Code (IBC).
 - b. Evaluation Services Reports.

1.02 DEFINITIONS

- A. ICC Evaluation Services Report: Published by ICC for products provided by concrete adhesive anchor manufacturers.
- B. Special Inspection: As defined in the ICC IBC.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Manufacturer's catalog information.
- B. Informational Submittals:
 - 1. Manufacturer's qualifications; include client name, address, contact person, phone number, project location, and description of Work.
 - 2. Manufacturer's instructions for preparation, placement, drilling of holes, installation of anchors and adhesive, and handling of cartridges, nozzles, and equipment.
 - 3. Manufacturer's written letter of certification identifying installer's qualifications to install products.
 - 4. ICC Evaluation Services Report: Specific to proposed doweling system manufacturer.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: At least three similar projects with same products within last 3 years.
2. Installer: Trained and certified by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
- B. Store adhesive components in accordance with manufacturer's written instructions.
- C. Dispose of when:
1. Shelf life has expired.
 2. Stored other than per manufacturer's instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Adhesive:

1. Approved by an ICC Evaluation Services Report for conformance to 2009 IBC requirements for doweling of steel reinforcing bars in cracked concrete.
2. Suitable for long-term loads as well as for wind and seismic loads.
3. Meet requirements of ASTM C881/C881M.
4. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
5. Disposable, Self-Contained Cartridge System:
 - a. Capable of dispensing both components in proper mixing ratio.
 - b. Fit into manually or pneumatically operated caulking gun.
6. Mixed Adhesive: Nonsag, light paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runout.
7. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
8. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT-RE 500-SD or HIT-HY 150 MAX-SD Adhesive Anchors.
 - b. Powers Fasteners, Brewster, NY; Power PE1000+ Epoxy Adhesive Anchor System (1/2-inch to 7/8-inch diameter anchors).

- c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-XP Epoxy Adhesive Anchors.
- B. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.
- C. Reinforcing Dowels: As specified in Section 03 21 00, Reinforcing Steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Drilling Equipment:
 - 1. Drilling Hammers for Dowel Holes:
 - a. Electric or pneumatic rotary type with medium or light impact.
 - b. Hollow drills with flushing air systems are preferred.
 - 2. Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.
- B. Hole Diameter: Use drill bit diameter meeting ICC Evaluation Services Report requirements and as recommended by manufacturer.
- C. Obstructions in Drill Path: When existing reinforcing steel is encountered during drilling, obtain Engineer approval for proposed fix.
- D. Doweling:
 - 1. Install per details shown on Drawings and in accordance with adhesive manufacturer's instructions.
 - 2. When using epoxy anchors, dowels may be prebent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.
 - 3. Bent Bar Dowels: Where edge distances are critical, and intersection with reinforcing steel is likely, drill hole at 10-degree angle or less and use prebent reinforcing bars.
 - 4. If bars have fused epoxy coating and coating is damaged, recoat damaged area with epoxy.
- E. Adhesive:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Dispense components through specially designed static mixing nozzle that thoroughly mixes components and places mixed adhesive at base of predrilled hole.

3.02 FIELD QUALITY CONTROL

A. Special Inspection:

1. Special inspection will be performed by the Special Inspector in accordance with ICC ESR requirements and as specified in Section 01 45 33, Special Inspection, Observation, and Testing.
2. Continuous inspection required where noted on Drawings and where concrete dowels are installed in overhead applications.
3. Periodic inspection required where continuous inspection is not specified.

END OF SECTION

SECTION 03 64 23
CRACK REPAIR EPOXY INJECTION GROUTING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American Association of State Highway and Transportation Officials (AASHTO): T237, Standard Method of Test for Testing Epoxy Resin Adhesive.
 2. American National Standards Institute (ANSI).
 3. ASTM International (ASTM):
 - a. C882, Standard Specification for Test Method for Bond Strength of Epoxy-Resin System Used with Concrete by Slant Shear.
 - b. D570, Standard Test Method for Water Absorption of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.02 DEFINITIONS

- A. Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.
- B. Crack Injection: Method of sealing or repairing cracks by injecting a polymer.
- C. Large Cracks: Wider than 0.015 inch.
- D. Small Cracks: Width equal to 0.015 inch or less.

1.03 SUBMITTALS

- A. Action Submittals:
1. Physical and chemical properties for epoxy adhesives.
 2. Technical data for metering, mixing, and injection equipment.

B. Informational Submittals:

1. Manufacturer's recommended surface preparation procedures and application instructions for epoxy adhesives.
2. Installation instructions for repairing core holes with epoxy grout.
3. Manufacturer's Certificate of Compliance: Certified test results for each batch of epoxy adhesive.
4. Statements of Qualification for Epoxy Adhesive:
 - a. Manufacturer's Site representative.
 - b. Injection applicator.
 - c. Injection pump operating technician.
5. Epoxy adhesive two component ratio and injection pressure test records for concrete crack repair work.

1.04 QUALITY ASSURANCE

A. Qualifications for Epoxy Injection Staff:

1. Manufacturer's Site Representative:
 - a. Capable of instructing successful methods for restoring concrete structures utilizing epoxy injection process.
 - b. Understands and is capable of explaining technical aspects of correct material selection and use.
 - c. Experienced in the operation, maintenance, and troubleshooting of application equipment.
2. Injection crew and job foreman shall provide written and verifiable evidence showing compliance with the following requirements:
 - a. Licensed and certified by epoxy manufacturer.
 - b. Minimum 3 years' experience in successful epoxy injection for at least 10,000 linear feet of successful crack injection including 2,000 linear feet of wet crack injection to stop water leakage.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Package adhesive material in new sealed containers and label with following information:

1. Manufacturer's name.
2. Product name and lot number.
3. ANSI Hazard Classification.
4. ANSI recommended precautions for handling.
5. Mix ratio by volume.

B. Storage and Protection: Store adhesive containers at ambient temperatures below 110 degrees F and above 45 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this Section shall be products of:
1. BASF Building Systems, Shakopee, MN; SCB Concrecive Series.
 2. Sika Corp., Lyndhurst, NJ; Sikadur Series.
 3. Euclid Chemical Co., Cleveland, OH; Euco Series.

2.02 EPOXY ADHESIVE

- A. Two-component A and B structural epoxy adhesive for injection into cracks or other voids in concrete structures for bonding or grouting.
- B. Adhesive Properties:

	Test Method	
7-day, Tensile Strength, psi	ASTM D638	5,000 min.
Tensile Elongation @ Break, percent	ASTM D638	1.0% min.
Compressive Yield Strength, 7 days @ 73°F, psi	ASTM D695 ^a	8,000 min.
Compressive Modulus, psi	ASTM D695 ^a	1.5x10 ⁵ min.
Heat Deflection Temperature, °F	ASTM D648 ^a	120 min. ^a
Water absorption @ 24 hours, Maximum %	ASTM D570	1.0
Bond Strength @ 2 days psi	ASTM C882	1,000 min.
Bond Strength @ 14 days psi	ASTM C882	1,500 min.
Slant Shear Strength: (5,000 psi Compressive Strength Conc.) <i>Where test results are available psi.</i>	AASHTO T237 ^b	
Cured 3 days @ 40 deg F—Wet Concrete		3,500 min.
Cured 1 day @ 77 deg F—Dry Concrete		5,000 min.
Cured 3 days @ 77 deg ± 3 deg F		5,000 min.
^a Cure test specimens so that peak exothermic temperature of adhesive does not exceed 100°F.		
^b See referenced specifications for preparation method of test specimens.		

2.03 SURFACE SEAL

- A. Sufficient strength and adhesion for holding injection fittings firmly in place, and to resist pressures preventing leakage during injection.
- B. Capable of removal after injection adhesive has cured.

2.04 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of adhesive.
- B. Pot Life Test:
 - 1. Condition Components A and B to required temperature.
 - 2. Measure components in ratio of Component B as stated on manufacturer's label into an 8-fluid ounce paper cup.
 - 3. Start stopwatch immediately and mix components for 60 seconds using wooden tongue depressor, take care to scrape sides and bottom of cup periodically.
 - 4. Probe mixture once with tongue depressor every 30 seconds, starting 2 minutes prior to minimum specified pot life.
 - 5. Pot Life Definition: Time at which a soft stringy mass forms in center of cup.
- C. Fabrication of Slant Shear Specimens for Testing Bond of Injectable Adhesives to Wet Concrete at 40 Degrees F:
 - 1. Scope: Test method for preparation of diagonal concrete mortar blocks used in determining slant shear strength of low viscosity injectable adhesives in accordance with AASHTO T237 when concrete is wet.
 - 2. Materials:
 - a. Diagonal concrete mortar blocks prepared in accordance with AASHTO Test Method T237 and cured to produce a mortar with compressive strength of 5,000 psi or greater.
 - b. Paraffin wax.
 - c. Masking Tape: 3/4 inch wide.
 - d. Suitable 20-mil-thick shim stock.
 - 3. Preparation:
 - a. Place a 20-mil shim between diagonal faces of two blocks and align so ends and sides are square.
 - b. Bind block with masking tape covering gap between blocks.
 - c. Leave a gap between blocks on one face uncovered for removal of shim and application of adhesive.
 - d. Paint melted paraffin wax over masking tape.
 - e. Shallow dam may be built up around opening using paraffin wax or modeling clay to help retain adhesive.

- f. Apply suitable capping compound to each end of specimen producing smooth surfaces perpendicular to longitudinal axis of block.
- g. Remove shim stock from gap opening.
- h. Soak specimen in water at 40 degrees F, plus or minus 3 degrees F for at least 24 hours.
- i. After soaking, remove specimen, shake free water from surface and gap opening.
- j. Prepare liquid adhesive.
- k. Within 5 minutes after removing specimen from water, start flowing adhesive into crack without entrap air bubbles.
- l. Place specimen in 40 degrees F, plus or minus 3 degrees F ambient for curing within 15 minutes after removing specimen from water for bonding. Do not expose specimen to temperatures beyond 77 degrees F during the 15-minute period.
- m. Cure specimen for 72 hours, plus or minus 4 hours at 40 degrees F, plus or minus 3 degrees F.

PART 3 EXECUTION

3.01 GENERAL

- A. Structurally repair cracks in structures as specified in Section 03 30 00, Cast-in-Place Concrete.
- B. Cracks:
 - 1. Repair by injection of epoxy adhesive.
 - 2. Repair cracks where specified or as shown.

3.02 PREPARATION

- A. Free cracks from loose matter, dirt, laitance, oil, grease, salt, and other contaminants.
- B. Clean cracks in accordance with epoxy adhesive manufacturer's instructions.
- C. Clean surfaces adjacent to cracks from dirt, dust, grease, oil, efflorescence, and other foreign matter detrimental to bond of surface seal system.
- D. Do not use acids and corrosives for cleaning, unless neutralized prior to injecting epoxy.

3.03 APPLICATION

- A. Sealing: Apply surface seal in accordance with manufacturer's instructions to designated crack face prior to injection. Seal surface of crack to prevent escape of injection epoxy.
- B. Entry Ports:
 - 1. Establish openings for epoxy entry in surface seal along crack.
 - 2. Determine space between entry ports equal to thickness of concrete member to allow epoxy to penetrate to the full thickness of the wall.
 - 3. Provide a means to prevent concrete dusts and fines from contaminating the crack or ports when drilling.
 - 4. Space entry ports closer together to allow adjustment of injection pressure to obtain minimum loss of epoxy to soil at locations where:
 - a. Cracks extend entirely through wall.
 - b. Backfill of walls on one side.
 - c. Difficult to excavate behind wall to seal both crack surfaces.
 - 5. Core drill to verify epoxy depth where only one side of wall is exposed.
- C. Epoxy Injection:
 - 1. Store epoxy at minimum of 70 degrees F.
 - 2. Start injection into each crack at lowest elevation entry port.
 - 3. Continue injection at first port until adhesive begins to flow out of port at next highest elevation.
 - 4. Plug first port and start injection at second port until adhesive flows from next port.
 - 5. Inject entire crack with same sequence.
- D. Finishing:
 - 1. Cure epoxy adhesive after cracks have been completely filled to allow surface seal removal without draining or runback of epoxy material from cracks.
 - 2. Remove surface seal from cured injection adhesive.
 - 3. Finish crack face flush with adjacent concrete.
 - 4. Indentations or protrusions caused by placement of entry ports are not acceptable.
 - 5. Remove surface seal material and injection adhesive runs and spills from concrete surfaces.

3.04 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter and mix two adhesive components, and inject mixture into crack.

- B. Pumps:
 - 1. Electric or air powered with interlocks providing positive ratio control of proportions for the two components at nozzle.
 - 2. Primary injection pumps for each material of different mix ratio, including a standby backup pump of similar ratio.
 - 3. Capable of immediate compensation for changes in resins.
 - 4. Do not use batch mix pumps.
- C. Discharge Pressure: Automatic pressure controls capable of discharging mixed adhesive at pressures up to 200 psi, plus or minus 5 percent, and able to maintain pressure.
- D. Automatic Shutoff Control: Provide sensors on both Component A and B reservoirs for stopping machine automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance: Maintain epoxy adhesive manufacturer's prescribed mix ratio within a tolerance of plus or minus 5 percent by volume at discharge pressure up to 160 psi.
- F. Ratio/Pressure Check Device:
 - 1. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing valve to restrict material flow.
 - 2. Pressure gauge capable of sensing pressure behind each valve.

3.05 FIELD QUALITY CONTROL

- A. Epoxy Adhesive Two Component Ratio Tests:
 - 1. Disconnect mixing head and pump two adhesive components simultaneously through ratio check device.
 - 2. Adjust discharge pressure to 160 psi for both adhesive components.
 - 3. Simultaneously discharge both adhesive components into separate calibrated containers.
 - 4. Compare amounts simultaneously discharged into calibrated containers during same time period to determine mix ratio.
 - 5. Complete test at 160 psi discharge pressure and repeat procedure for 0 psi discharge pressure.
 - 6. Run ratio test for each injection unit at beginning and end of each injection work day, and when injection work has stopped for more than 1 hour.
 - 7. Document and maintain complete accurate records of, ratios and pressure checks.

B. Injection Pressure Test:

1. Disconnect mixing head of injection equipment and connect two adhesive component delivery lines to pressure check device.
2. Pressure Check Device:
 - a. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing of valve.
 - b. Pressure gauge capable of sensing pressure buildup behind each valve.
3. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 psi.
4. Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 psi within 3 minutes.
5. Run pressure test for each injection equipment unit:
 - a. Beginning and end of each injection work day.
 - b. When injection work as stop for more than 45 minutes.
6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

C. Crack Injection Tests:

1. Initial Cores:
 - a. 4-inch diameter for full crack depth taken from Engineer selected locations.
 - b. Take three cores in first 100 linear feet of crack repaired and one core sample for each 500 linear feet thereafter.
2. Provide suitable containers for storage, curing, and transportation of test specimens.
3. Methods of Testing Cores:
 - a. Penetration: Visual examination.
 - b. Bond Strength/Compression Test: Concrete failure prior to adhesive failure.
4. Test Requirements:
 - a. Penetration: Minimum of 90 percent of crack shall be full of epoxy adhesive.
 - b. Bond Strength/Compression Test: Concrete failure before adhesive failure, or 6,500 psi with no failure of either concrete or adhesive.
5. Evaluation and Acceptance of Tests:
 - a. If initial cores pass tests as specified, epoxy adhesive injection Work at area represented by cores will be accepted.
 - b. If initial cores fail either by lack of penetration or bond strength, crack repair Work shall not proceed further until areas represented by cores are reinjected or repaired and retested for acceptance.

- c. Obtain verifying core samples, number and location as selected by Engineer, after rework of areas represented by failed initial cores is complete.
- 6. Core Hole Repair:
 - a. Correct Work as result of testing upon notification from Engineer.
 - b. Refill initial and verifying core holes with an epoxy grout tamped and rodded in-place to form a dense fill.
 - c. Finish surface to blend with adjacent concrete.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. The Aluminum Association, Inc. (AA): The Aluminum Design Manual.
2. American Galvanizers Association (AGA):
 - a. Inspection of Hot-Dip Galvanized Steel Products.
 - b. Quality Assurance Manual.
3. American Iron and Steel Institute (AISI): Stainless Steel Types.
4. American Ladder Institute (ALI): A14.3, Ladders - Fixed - Safety Requirements.
5. American National Standards Institute (ANSI).
6. American Society of Safety Engineers (ASSE): A10.11, Safety Requirements for Personnel and Debris Nets.
7. American Welding Society (AWS):
 - a. D1.1/D1.1M, Structural Welding Code - Steel.
 - b. D1.2/D1.2M, Structural Welding Code - Aluminum.
 - c. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
8. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A48/A48M, Specification for Gray Iron Castings.
 - c. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - d. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - e. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - f. A143/A143M, Standard for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - g. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - h. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - i. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

- j. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- k. A276, Standard Specification for Stainless Steel Bars and Shapes.
- l. A283/A283M, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- m. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- n. A325, Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
- o. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- p. A384/A384M, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
- q. A385/A385M, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- r. A489, Standard Specification for Carbon Steel Lifting Eyes.
- s. A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- t. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- u. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- v. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- w. A780/A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- x. A786/A786M, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- y. A793, Standard Specification for Rolled Floor Plate, Stainless Steel.
- z. A967, Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- aa. A992/A992M, Standard Specification for Structural Steel Shapes.
- bb. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- cc. B308/B308M, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- dd. B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- ee. B632/B632M, Standard Specification for Aluminum-Alloy Rolled Tread Plate.

- ff. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - gg. D1056, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 - hh. F436, Standard Specification for Hardened Steel Washers.
 - ii. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 - jj. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - kk. F594, Standard Specification for Stainless Steel Nuts.
 - ll. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
 - mm. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- 9. International Code Council Evaluation Service (ICC-ES):
 - a. AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.
 - b. AC106, Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements.
 - c. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - d. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
 - e. AC70, Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements.
 - 10. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.27, Fixed Ladders.
 - b. 29 CFR 1926.105, Safety Nets.
 - c. 29 CFR 1926.502, Fall Protection Systems Criteria and Practices.
 - 11. Specialty Steel Industry of North America (SSINA):
 - a. Specifications for Stainless Steel.
 - b. Design Guidelines for the Selection and Use of Stainless Steel.
 - c. Stainless Steel Fabrication.
 - d. Stainless Steel Fasteners.

1.02 DEFINITIONS

- A. Anchor Bolt: Cast-in-place anchor; concrete or masonry.
- B. Concrete Anchor: Post-installed concrete anchors listed in this specification.
- C. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.
- D. Exterior Area: Location not protected from weather by building or other enclosed structure.

- E. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or washdown, nor where wall or roof slab is common to a water-holding or earth-retaining structure.
- F. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or washdown, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.
- G. Submerged: Location at or below top of wall of open water-holding structure, such as basin or channel, or wall, ceiling or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
 - a. Metal fabrications, including welding and fastener information.
 - b. Specific instructions for concrete anchor installation, including drilled hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.
- 2. Samples: Color samples of abrasive stair nosings.

B. Informational Submittals:

- 1. Concrete and Masonry Post-Installed Anchors:
 - a. Manufacturer's product description and printed installation instructions.
 - b. Current ICC-ES Report for each type of post-installed anchor to be used.
 - c. Adhesive Anchor Installer Certification.
- 2. U-Channel Concrete Inserts:
 - a. Manufacturer's product description.
 - b. Allowable load tables.
- 3. Ladders: Letter of certification that ladder meets OSHA 29 CFR 1910.27 requirements.
- 4. Passivation method for stainless steel members.
- 5. Hot-Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Adhesive Anchor Installer: Trained to install adhesive anchors in accordance with manufacturer's printed installation instructions.
2. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as practical, factory assemble specified items. Assemblies, because of necessity, have to be shipped unassembled shall be packaged and tagged in manner that will protect materials from damage and will facilitate identification and field assembly.
- B. Package stainless steel items in a manner to provide protection from carbon impregnation.
- C. Protect painted coatings and hot-dip galvanized finishes from damage as a result of metal banding and rough handling. Use padded slings and straps.
- D. Store fabricated items in dry area, not in direct contact with ground.
- E. Store adhesives anchors at service temperature ranges recommended by manufacturer.

PART 2 PRODUCTS

2.01 GENERAL

- A. For hot-dip galvanized steel that is exposed to view and does not receive paint, limit the combined phosphorus and silicon content to 0.04 percent. For steels that require a minimum of 0.15 percent silicon (such as plates over 1.5 inches thick for ASTM A36/A36M steel), limit maximum silicon content to 0.21 percent and phosphorous content to 0.03 percent.
- B. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Other Steel Shapes and Plates	A36/A36M
Steel Pipe	A501 or A53/A53M, Type E or S, Grade B
Hollow Structural Sections (HSS)	A500/A500M, Grade B

Item	ASTM Reference
Stainless Steel:	
Bars and Angles	A276, AISI Type 316 (316L for welded connections)
Shapes	A276, AISI Type 304 (304L for welded connections)
Steel Plate, Sheet, and Strip	A240/A240M, AISI Type 316 (316L for welded connections)
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316, Condition CW
Nuts	F594, AISI Type 316, Condition CW
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts
Anchor Bolts and Rods	F1554, Grade 55, with weldability supplement S1.
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436
Welded Anchor Studs	A108, Grades C-1010 through C-1020
Cast Iron	A48/A48M, Class 35

- C. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Fastener Schedule at end of this Section.

2.02 ANCHOR BOLTS AND ANCHOR BOLT SLEEVES

A. Cast-In-Place Anchor Bolts:

1. Headed type, unless otherwise shown on Drawings.
2. Material type and protective coating as shown in Fastener Schedule at end of this Section.

B. Anchor Bolt Sleeves:

1. Plastic:
 - a. Single unit construction with corrugated sleeve.
 - b. Top of sleeve shall be self-threading to provide adjustment of threaded anchor bolt projection.
 - c. Material: High-density polyethylene.
 - d. Manufacturer: Sinco Products, Inc., Middletown, CT, (800) 243-6753.
2. Fabricated Steel: ASTM A36/A36M.

2.03 POST-INSTALLED CONCRETE ANCHORS

A. General:

1. AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Fastener Schedule at end of this Section.
2. Current ICC-ES Report indicating acceptance per IBC 2006 and IBC 2009 for anchors at structural applications in cracked concrete.
3. Anchors shall be suitable for long-term loads, as well as for wind and seismic loads.
4. Acceptable for use in potable water structures by EPA and local health agencies or NSF 61.
5. Torque-Controlled Expansion Anchors (Wedge Anchors):
 - a. Wedge anchors used in sustained tension applications (such as overhead or cantilevered applications) shall have current ICC-ES Report that demonstrates compliance with ICC-ES AC193 for cracked concrete.
 - b. Manufacturers and Products:
 - 1) ITW Ramset/Red Head, Addison, IL; Trubolt+ Wedge Anchor (ESR-2427).
 - 2) Hilti, Inc., Tulsa, OK; Kwik-Bolt-TZ (KB-TZ) Anchors (ESR-1917).
 - 3) Powers Fasteners, Brewster, NY; Power-Stud +SD2 or +SD1 Anchors (ESR-2502 and ESR-2818).
 - 4) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt Anchors (ESR-1771).
 - 5) Wej-It Corp., Tulsa, OK; ANKRtite CCAT Wedge Anchor (ESR-2777).
6. Undercut Anchors:
 - a. When used in sustained tension applications (such as overhead or cantilevered applications) shall have current ICC-ES Report that demonstrates compliance with ICC-ES AC193 for cracked concrete.

- b. Manufacturers and Products:
 - 1) USP Structural Connectors, Burnsville, MN; DUC Undercut Anchor (ESR-1970).
 - 2) Hilti, Inc., Tulsa, OK; HDA Undercut Anchor (ESR-1546).
 - 3) Powers Fasteners, Brewster, NY; Atomic+ Undercut (ESR-3067).
 - 4) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Torq-Cut (ESR pending).

B. Adhesive Anchors (Epoxy Anchors):

- 1. If approved by Engineer, adhesive anchors used in sustained tension applications (such as overhead or cantilevered applications) shall have current ICC-ES Report that demonstrates compliance with ICC-ES AC308 for cracked concrete.
- 2. Threaded Rod:
 - a. ASTM F593 stainless steel threaded rod, diameter as shown on Drawings.
 - b. Length as required, to provide minimum depth of embedment.
 - c. Clean and free of grease, oil, or other deleterious material.
 - d. For hollow-unit masonry, provide galvanized or stainless steel wire cloth screen tube to fit threaded rod.
- 3. Adhesive:
 - a. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
 - b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
 - c. Mixed Adhesive: Nonsag light paste consistency with ability to remain in 1-inch diameter overhead drilled hole without runout.
 - d. Meet requirements of ASTM C881/C881M.
- 4. Packaging and Storage:
 - a. Disposable, self-contained cartridge system capable of dispensing both components in proper mixing ratio and fitting into manually or pneumatically operated caulking gun.
 - b. Store adhesive cartridges on pallets or shelving in covered storage area.
 - c. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
 - d. Dispose of when:
 - 1) Shelf life has expired.
 - 2) Stored other than in accordance with manufacturer's instructions.
- 5. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT RE 500 SD (ESR-2322).

- b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-XP Epoxy Adhesive Anchors(ESR-2508).
- c. Powers Fasteners, Brewster NY, PE1000+ Adhesive anchoring system (ESR-2583).

C. Adhesive Threaded Inserts:

- 1. Stainless steel, internally threaded inserts.
- 2. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-RN Insert with HIT-RE 500-SD adhesive.

2.04 STUD SHEAR CONNECTORS

A. Headed anchor studs (HAS), or threaded anchor studs (TAS), or stud shear connectors, as indicated on Drawings.

- 1. Carbon Steel: ASTM A108, Standard Quality Grades 1010 through 1020, inclusive either semikilled or killed aluminum or silicon dioxiation, unless indicated otherwise.
- 2. Stainless Steel: ASTM F593, AISI Type 316, Condition CW, where indicated.

B. Manufacturers:

- 1. Nelson Stud Welding, FabriSteel Co., Elyria, OH.
- 2. Stud Welding Associates, Inc., Elyria, OH.

2.05 PIPE SLEEVES

A. ASTM A53/A53M, Schedule 40 steel pipe sleeves with continuously welded 3/16-inch-thick seep ring with outside diameter 3 inches greater than sleeve outside diameter. Hot-dip galvanize in accordance with ASTM A123/A123M.

2.06 EMBEDDED STEEL SUPPORT FRAMES FOR FLOOR PLATE AND GRATING

A. Steel angle support frames to be embedded in concrete shall be stainless steel, ASTM A276, AISI Type 316, unless indicated otherwise.

B. Welded anchors for stainless steel support frames shall also be stainless steel.

2.07 ABRASIVE NOSING FOR STAIRS

A. Unless otherwise shown on Drawings, furnish flush type abrasive nosings on stairs.

B. Nosing Components:

1. Homogeneous epoxy abrasive, with minimum 50 percent aluminum oxide content, formed and cured upon an extruded aluminum base.
2. Epoxy abrasive shall extend over and form curved front edge of nosing.
3. Base of Nosing: Extruded aluminum alloy, 6063-T5, heat-treated.

C. Anchoring System: Double-set anchors consisting of two rows of integrally extruded anchors.

D. Size: 3 inches wide by 1/4 inch to 3/8 inch thick by length as shown.

E. Color: Selected by Engineer from manufacturer's standard color range.

F. Manufacturers and Products:

1. Wooster Products, Inc., Wooster, OH; Spectra Type WP3J and Spectra Type WP3C.
2. American Safety Tread Co., Inc., Helena, AL; Type BF-311D and Type FA-311D.

2.08 LADDERS

A. Fabricate ladders with rails, rungs, landings, and cages to meet applicable requirements of OSHA, CFR Part 1910.27, and ALI A14.3.

1. Concentrated load of 200 pounds loads imposed by persons occupying ladder shall be considered to be concentrated at such points as will cause maximum stress in structural member being considered.
2. Weight of ladder and attached appurtenances together with live load shall be considered in design of rails and fastenings.
3. Self-closing gates at landings.

B. Flat Bar Ladder:

1. Punch rails, pass rungs through rails, and weld on outside.
2. Weld brackets to ladder for fastening ladder to wall.
3. Hot-dip galvanize steel after fabrication in accordance with ASTM A123/A123M and ASTM A385/A385M.

2.09 ACCESSORIES

A. Antiseizing Lubricant for Stainless Steel Threaded Connections:

1. Suitable for potable water supply.
2. Resists washout.

3. Manufacturers and Products:
 - a. Bostik, Middleton, MA; Neverseez.
 - b. Saf-T-Eze Div., STL Corp., Lombard, IL; Anti-Seize.

2.10 FABRICATION

A. General:

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Grind cut edges smooth and straight. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Fit and assemble in largest practical sections for delivery to Site.

B. Materials:

1. Use steel shapes, unless otherwise noted.
2. Steel to be hot-dip galvanized: Limit silicon content to less than 0.04 percent or to between 0.15 and 0.25 percent.

C. Welding:

1. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
2. Welded fabrications shall be free from twisting or distortion caused by improper welding techniques.
3. Steel: Meet fabrication requirements of AWS D1.1/D1.1M, Section 5.
4. Aluminum: Meet requirements of AWS D1.2/D1.2M.
5. Stainless Steel: Meet requirements of AWS D1.6/D1.6M.
6. Welded Anchor Studs: Prepare surface to be welded and weld with stud welding gun in accordance with AWS D1.1/D1.1M, Section 7, and manufacturer's instructions.
7. Complete welding before applying finish.

D. Painting:

1. Shop prime with rust-inhibitive primer as specified in Section 09 90 00, Painting and Coating, unless otherwise indicated.
2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.

3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.

E. Galvanizing:

1. Fabricate steel to be galvanized in accordance with ASTM A143/A143M, ASTM A384/A384M, and ASTM A385/A385M. Avoid fabrication techniques that could cause distortion or embrittlement of the steel.
2. Provide venting and drain holes for tubular members and fabricated assemblies in accordance with ASTM A385/A385M.
3. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.
4. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.
5. Hot-dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM A123/A123M.
6. Hot-dip galvanize bolts, nuts, washers, and hardware components in accordance with ASTM A153/A153M. Oversize holes to allow for zinc alloy growth. Shop assemble bolts and nuts.
7. Galvanized steel sheets in accordance with ASTM A653/A653M.
8. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.

F. Electrolytic Protection: Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.

G. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.

H. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

2.11 SOURCE QUALITY CONTROL

A. Visually inspect all fabrication welds and correct deficiencies.

1. Steel: AWS D1.1/D1.1M, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.
2. Aluminum: AWS D1.2/D1.2M.
3. Stainless Steel: AWS D1.6/D1.6M.

B. Hot-Dip Galvanizing:

1. An independent testing agency shall be retained by Contractor and approved by Engineer to inspect and test hot-dip galvanized fabricated items in accordance with ASTM A123/A123M and ASTM A153/A153M.
2. Visually inspect and test for thickness and adhesion of zinc coating for minimum of three test samples from each lot in accordance with ASTM A123/A123M and ASTM A153/A153M.
3. Reject and retest nonconforming articles in accordance with ASTM A123/A123M and ASTM A153/A153M.

PART 3 EXECUTION

3.01 INSTALLATION OF METAL FABRICATIONS

A. General:

1. Install metal fabrications plumb and level, accurately fitted, free from distortion or defects.
2. Install rigid, substantial, and neat in appearance.
3. Install manufactured products in accordance with manufacturer's recommendations.
4. Obtain Engineer approval prior to field cutting steel members or making adjustments not scheduled.

B. Aluminum:

1. Do not remove mill markings from concealed surfaces.
2. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.
3. Fabrication, mechanical connections, and welded construction shall be in accordance with the AA Aluminum Design Manual.

C. Pipe Sleeves:

1. Provide where pipes pass through concrete.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide center flange for water stoppage on sleeves in exterior or water-bearing walls.
4. Provide rubber caulking sealant or a modular mechanical unit to form watertight seal in annular space between pipes and sleeves.

3.02 CAST-IN-PLACE ANCHOR BOLTS

- A. Locate and hold anchor bolts in place with templates at time concrete is placed.
- B. Use anchor bolt sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.
- C. Minimum Bolt Size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

3.03 CONCRETE POST-INSTALLED ANCHORS

- A. Begin installation only after concrete to receive anchors has attained design strength.
- B. Install in accordance with manufacturer's instructions.
- C. Provide minimum embedment, edge distance, and spacing as follows, unless indicated otherwise by anchor manufacturer's instructions or shown otherwise on Drawings:

Anchor Type	Minimum Embedment (Bolt Diameters)	Minimum Edge Distance (Bolt Diameters)	Minimum Spacing (Bolt Diameters)
Expansion	9	6	12
Undercut	9	12	16
Adhesive	9	9	13.5

- D. Use only drill type and bit type and diameter recommended by anchor manufacturer. Clean hole of debris and dust with brush and compressed air per manufacturer's printed installation instructions.
- E. For undercut anchors, use special undercutting drill bit and rotary hammer drill and apply final torque as recommended by anchor manufacturer.
- F. When embedded steel or rebar is encountered in drill path, slant drill to clear obstruction. If drill must be slanted more than 10 degrees to clear obstruction, notify Engineer for direction on how to proceed.
- G. Adhesive Anchors:
 - 1. Do not install adhesive anchors when temperature of concrete is below 40 degrees F or above 100 degrees F, unless cold temperature adhesives,

compliant with ACI 308 are used. Refer to the respective ICC-ES report and manufacturer's printed installation instructions.

2. Remove water from hole with oil-free compressed air. Damp or water filled holes may be allowed only if approved in manufacturer's printed installation instructions and ICC-ES report.
3. Do not disturb anchor during recommended curing time.
4. Do not exceed maximum torque as specified in manufacturer's printed installation instructions.

3.04 ABRASIVE NOSINGS

- A. Provide abrasive nosings on concrete steps not being supplied or coated with another type of nosing or nonskid material.

3.05 ELECTROLYTIC PROTECTION

- A. Aluminum and Galvanized Steel:

1. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
2. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.
3. Allow coating to dry before installation of the material.
4. Protect coated surfaces during installation.
5. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.

- B. Titanium: Where titanium equipment is in contact with concrete or dissimilar metal, provide full-face neoprene insulation gasket, 3/32-inch minimum thickness and 70-durometer hardness.

- C. Stainless Steel:

1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.
2. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
3. Remove contamination using cleaning and passivation methods in accordance with requirements of ASTM A380 and ASTM A967.
4. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles.
5. After treatment, visually inspect surfaces for compliance.

3.06 PAINTING

- A. Painted Galvanized Surfaces: Prepare as specified in Section 09 90 00, Painting and Coating.
- B. Repair of Damaged Hot-Dip Galvanized Coating:
 - 1. Conform to ASTM A780/A780M.
 - 2. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780/A780M.
 - 3. For flame cut or welded areas, use zinc-based solder, or zinc sticks, conforming to ASTM A780/A780M.
 - 4. Use magnetic gauge to determine thickness is equal to or greater than base galvanized coating.

3.07 FIELD QUALITY CONTROL

- A. Owner-Furnished Quality Assurance:
 - 1. In accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings.
 - 2. Contractor responsibilities and related information on special inspection, observation, and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control:
 - 1. Inspection and testing required in Section 01 45 16.13, Contractor Quality Control.
 - 2. Certificate of Compliance per Section 01 43 33, Manufacturers' Field Services, for test results, or calculations, or drawings that ensure material and equipment design and design criteria meet requirements of Section 01 88 15, Seismic Anchorage and Bracing.
- C. Concrete Drilled Anchors: Special inspection and testing will be provided by Owner where indicated on Drawings.

3.08 FASTENER SCHEDULE

A. Unless indicated otherwise on Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Anchor Bolts Cast Into Concrete for Structural Steel, Metal Fabrications and Castings		
Interior Dry Areas	Stainless steel headed anchor bolts, unless indicated otherwise	
Exterior and Interior Wet Areas	Stainless steel headed anchor bolts	
Submerged and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating	See Section 09 90 00, Painting and Coating
2. Anchor Bolts Cast Into Concrete for Equipment Bases		
Interior Dry Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating, unless otherwise specified with equipment	See Section 09 90 00, Painting and Coating
3. Drilled Anchors for Metal Components to Cast-in-Place Concrete (e.g., Ladders, Handrail Posts, Electrical Panels, and Equipment)		
Interior Dry Areas	Zinc-plated or stainless steel wedge or expansion anchors	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Adhesive stainless steel anchors	

Service Use and Location	Product	Remarks
4. Connections for Structural Steel Framing		
Exterior and Interior Wet and Dry Areas	High-strength steel bolted connections	Use hot-dipped galvanized high-strength bolted connections for galvanized steel framing members.
5. Connections of Aluminum Components		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections, unless otherwise specified with equipment	
6. All Others		
Exterior and Interior Wet and Dry Areas	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on stainless steel threads.
- C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

SECTION 05 52 19 STEEL RAILINGS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Iron and Steel Institute (AISI): As applicable.
2. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - d. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - e. A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - f. E894, Standard Test method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 - g. E935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
 - h. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
3. International Code Council (ICC):
 - a. 2009 International Building Code (IBC).
 - b. Evaluation Services Reports, as applicable.
4. Occupational Safety and Health Act (OSHA): 29 CFR 1910, Code of Federal Regulations.

1.02 DEFINITIONS

- A. ICC Evaluation Services Report: ICC report on evaluation of manufactured concrete anchor systems.
- B. Railings: This term shall include guardrail systems, handrail systems, platform railing systems, ramp-rail systems, and stair-rail systems. Railings may be comprised of a framework of vertical, horizontal, or inclined members, grillwork or panels, accessories, or combination thereof.
- C. Special Inspection: As defined by the ICC IBC.

- D. Toeboards: Vertical barrier at floor level usually erected on railings along exposed edges of floor or wall openings, platforms, or ramps to prevent miscellaneous items from falling through.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
 - a. Project-specific scaled plans and elevations of railings and detail drawings. Include railing profiles, sizes, connections, anchorage, size and type of fasteners, and accessories.
 - b. Manufacturer's literature and catalog data of railing and components.
 - c. Design Data: Where proposed design of post base connections is different than details shown on Drawings, submit calculations or test data for alternate railing anchorages using ICC IBC design loads.

B. Informational Submittals:

- 1. Manufacturer's assembly and installation instructions.
- 2. Special Inspection: Manufacturer's instructions for Special Inspection of post-installed concrete anchors.
- 3. Test Reports: Test data for anchorages may supplement design data submitted for alternate anchorage details. Testing of anchorages shall be in accordance with ASTM E894 and ASTM E935 using applied loads in accordance with the ICC IBC.

1.04 QUALITY ASSURANCE

- A. Qualifications: Calculations required for alternate anchorage designs (if proposed) shall be stamped by a registered civil or structural engineer licensed in the state where the Project will be constructed.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Railings adequately packaged and wrapped to prevent scratching and denting during shipment, storage, and installation. Maintain protective wrapping to the extent possible until railing is completely installed.

PART 2 PRODUCTS

2.01 STEEL RAILINGS

A. Pipe Railings/Round HSS:

1. Hot-dip galvanized carbon steel, ASTM A500/A500M Grade B.
2. Outside Diameter: 1.900-inch.
3. Wall Thickness:
 - a. Rail: 0.145-inch, minimum.
 - b. Post: 0.200-inch, minimum.

B. Accessories, including railing components, flanges, wall brackets, anchor plates, shall conform to the following:

1. Post Bolted Baseplate: Carbon steel ASTM A36/A36M, hot-dip galvanized.
2. Wall Brackets:
 - a. Malleable iron, round top, and galvanized.
 - b. Manufacturers and Products:
 - 1) The Wagner Companies; No. 1765.
 - 2) Julius Blum & Co., Inc.; No. 1382.
3. Rail Terminals (including Wall Returns):
 - a. Round, galvanized steel, welded to rail, with two 5/16-inch holes for 1/4-inch fasteners.
 - b. Manufacturer: The Wagner Companies.
4. Toeboards and Accessories:
 - a. ASTM A36/A36M steel, hot-dip galvanized.
 - b. Toeboards: Provide slotted holes for expansion and contraction where required.
 - c. Fasteners: Galvanized steel or stainless steel.

C. Metal supports embedded in concrete: In accordance with Section 05 50 00, Metal Fabrications.

D. Miscellaneous Fasteners: Galvanized steel or stainless steel.

2.02 ANCHOR BOLTS, FASTENERS, AND CONCRETE ANCHORS

A. Locknuts, Washers, and Screws:

1. Elastic Locknuts, Steel Flat Washers, Round Head Machine Screws (RHMS): Galvanized steel or stainless steel.
2. Flat Washers: Molded nylon.

- B. Bolts and Nuts for Bolting Railing to Metal Beams: Hot-dipped galvanized ASTM A325 bolts.
- C. Concrete Anchors:
 - 1. Stainless steel anchor rods conforming to ASTM F1554, Grade 36.
 - 2. Post-installed anchors shall be in accordance with Section 05 50 00, Metal Fabrications, unless otherwise specified herein.
 - 3. Bolt Diameter: 1/2 inch, minimum.

2.03 FABRICATION OF WELDED STEEL RAILINGS

- A. Shop Assembly:
 - 1. Post spacing and railing details shall be as shown on Drawings.
 - 2. Post to Baseplate Connection: Field fit-up is required as shown on Drawings.
 - 3. Alternate Post to Baseplate Connection:
 - a. Field measure elevation of concrete at each post location and determine exact post length so baseplate is on concrete surface.
 - b. Rails shall be in straight alignment when rails to posts and posts to baseplates are welded.
 - c. Field weld posts to baseplates.
 - 4. Remove burrs from cut edges.
 - 5. Form elbow bends and wall returns to uniform radius, free from buckles and twists, with finished surfaces smooth.
 - 6. Cover exposed ends of steel pipe by welding 1/8-inch minimum thickness steel plate in place or use prefabricated fittings.
 - 7. Welding:
 - a. In accordance with Section 05 50 00, Metal Fabrications.
 - b. Thoroughly fuse without undercutting or overlap.
 - c. Remove splatter, grind exposed welds to blend, and contour surfaces to match those adjacent.
 - d. Grind welds prior to hot-dip galvanizing of railing sections.
 - 8. Furnish explosion prevention holes at closed ends of pipes.
 - 9. Form and assemble joints exposed to weather to prevent water and moisture from penetrating.
- B. Shop/Factory Finishing: After fabrication hot-dip galvanize steel components, other than stainless steel components, in accordance with ASTM A123/A123M.

C. Tolerances:

1. Cut pipe square within 2 degrees and lengths within 1/8 inch.
2. Welding: Miter and cope intersections of posts and rails within 2 degrees, fit to within 0.020 inch, and perform continuous welds around joints.

D. Repair of Defective Work: Remove stains and replace defective Work.

PART 3 EXECUTION

3.01 GENERAL

- A. Where required, provide railing posts longer than needed and field cut to exact dimensions required in order to satisfy vertical variations on actual structure.
- B. Install railing with base that provides plus or minus 1/4-inch vertical adjustment inside base fitting. If adjustment is required in field and exceeds plus or minus 1/4-inch, reduce post length not to exceed beyond bottom of lowest set-screw or bolt in base fitting.
- C. Modification to supporting structure is not permitted where railing is to be attached.
- D. Protection from Entrapped Water:
1. Make provisions in exterior and interior installations subject to high humidity to drain water from railing system.
 2. For posts mounted in concrete, bends, and elbows occurring at low points drill weep holes of 1/4-inch diameter at lowest possible elevations, one hole per post or rail. Drill hole in plane of rail.

3.02 RAILING INSTALLATION

- A. Expansion Joints:
1. Maximum intervals of 54 feet on center and at structural movement joints.
 2. Slip joint with internal sleeve extending 2 inches beyond each side of joint. Provide 1/2-inch slip joint gap to allow for expansion.
 3. Fasten to one side using 3/8-inch diameter set-screw. Place set-screw at bottom of pipe.
 4. Locate joints within 12 inches of posts. Locate expansion joints in rails that span movement joints in structural walls and floors supporting the posts.

B. Posts and Rails:

1. Surface Mounted and Side Mounted Posts:
 - a. Bolt post baseplate connectors firmly in place.
 - b. Install to account for small variation in leveling grouts and shims between adjacent posts.
2. Set posts plumb and aligned to within 1/8 inch in 12 feet.
3. Set rails horizontal or parallel to slope of steps to within 1/8 inch in 12 feet.
4. Install posts and rails in same plane.
5. Remove projections or irregularities and provide a smooth surface for sliding hands continuously along top rail.
6. Use offset rail for use on stairs and platforms if post is attached to web of stringers or structural platform supports.
7. Support 1-1/2-inch rails directly above stairway stringers with offset fittings.

C. Wall Brackets: Support wall rails on brackets as shown on Drawings.

D. Toeboard:

1. Provide at railings, except where 4-inch or higher concrete curbs are installed, at gates, or on stairways unless shown otherwise.
2. Accurately measure in field for correct length; after railing post installation, cut and secure to posts.
3. Dimension between bottom of toeboard and walking surface not to exceed 1/4 inch.
4. Install plumb and aligned to within 1/8 inch in 12 feet.

E. Railing System Gate: Install in accordance with manufacturer's installation instructions.

3.03 FIELD FINISHING

- A. Treatment of Field Welds for Galvanized Steel Railings: Touch up welds by application of two coats high-zinc dust content paint to dry film thickness of 2 mils.

3.04 FIELD QUALITY CONTROL

- A. Post-installed anchors supporting railing systems require special inspection.
- B. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.

3.05 CLEANING

- A. Wash railing system thoroughly using clean water and soap. Rinse with clean water.
- B. Do not use acid solution, steel wool, or other harsh abrasive.

END OF SECTION

SECTION 05 53 00
METAL GRATINGS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. American Association of State Highway and Transportation Officials (AASHTO): Standard Specifications for Highway Bridges.
 2. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A510, Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
 - c. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - d. A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - e. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 3. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. MBG 531, Metal Bar Grating Manual.
 - b. MBG 532, Heavy-Duty Metal Bar Grating Manual.

1.02 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Grating: Show dimensions, weight, size, and location of connections to adjacent grating, supports, and other Work.
 - b. Grating Anchorage: Show details of anchorage to supports to prevent displacement from traffic impact.
 - c. Product data for grating, grating clips, anchors, accessories, and other manufactured products specified herein.
 - d. Manufacturer's specifications, including coatings, surface treatment, and finishes.
- B. Informational Submittals:
1. Special handling and storage requirements.
 2. Installation instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as is practical, factory assemble items.
- B. Package and clearly tag parts and assemblies that are, due to necessity, shipped unassembled.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this Section shall be products of:
 - 1. IKG Industries, Houston, TX.

2.02 GRATING MATERIALS

- A. Carbon Steel:
 - 1. Bearing Bars, Banding, and Rectangular Cross Bars:
ASTM A1011/A1011M commercial steel Type II for hot rolled carbon steel sheet and strip, or ASTM A36/A36M.
 - 2. Cross Bars made from Wire Rods: Not Permitted.
 - 3. Finish: Galvanized after fabrication.

2.03 METAL BAR GRATING

- A. General Requirements:
 - 1. Maximum Service Load:
 - a. Light Duty (Type A): 100 psf uniformly distributed load.
 - 2. Maximum Deflection: Span/240 or 1/4 inch, whichever is less.
 - 3. Bearing Bar Spacing:
 - a. Light Duty: 1-3/16 inches maximum, center-to-center.
 - 4. Cross Bar Spacing: 4 inches maximum, center-to-center.
 - 5. Bearing Bars, Cross Bars and Banding: Minimum thickness as specified in NAAMM MBG 531 or as shown on Drawings.
- B. Grating Materials:
 - 1. Galvanized steel welded, rectangular bar grating fabricated by electro-forging cross bars to bearing bars.
- C. Surface: Plain.

D. Stair Treads:

1. Material and Type: Same as grating material and grating type as furnished for connecting walkway or work surface.
2. Nosings: Integral ribbing and serrated edge on one long axis of tread, or nonslip abrasive on each tread along one long edge.
3. Carrier Plate or Angle: Furnish at each end for connection to stair stringers.

2.04 HEAVY-DUTY METAL BAR GRATING (TYPE C)

A. General Requirements:

1. Maximum Service Load: AASHTO H-20.
2. Maximum Deflection: Span/240.
3. Bearing Bar Spacing: 1-7/8 inches maximum center-to-center.
4. Cross Bar Spacing: 4 inches maximum center-to-center.
5. Bearing Bars, Cross Bars and Banding: Minimum thickness as specified in NAAMM MBG 532 or as shown on Drawings.
6. Grating Type: Galvanized steel, heavy-duty, rectangular bar grating fabricated by welding crossbars between rectangular bearing bars.

2.05 ACCESSORIES

A. Embedded Frames: As indicated on Drawings and as specified in Section 05 50 00, Metal Fabrications.

B. Grating Clamps:

1. Use at flanged beam and bolted angle frame supports.
2. Removable from above grating walkway surface.
3. Provide hat bracket, recessed bolt, and bottom clamp of same material as grating.
4. Manufacturers and Products:
 - a. Direct Metals Company, LLC, Kennesaw, GA; Grating Clamp.
 - b. Grating Fasteners, Inc., Harvey, LA; G-Clip.

C. Anchor Stud and Saddle Clip:

1. Use at embedded angle frame supports with stud anchor and nut recessed below top of grating surface.
2. Removable from above grating walkway surface.
3. Provide Type 316 stainless steel welded threaded stud anchor, nut, washer, and saddle clip.

4. Manufacturers and Products:
 - a. Welded Stud Anchor:
 - 1) Nelson Stud Welding, Inc., Elyria, OH.
 - 2) Stud Welding Associates, Inc. Elyria, OH.
 - b. Saddle Clip:
 - 1) Direct Metals Company, LLC, Kennesaw, GA; Saddle Clip.
 - 2) Grating Fasteners, Inc., Harvey, LA; Saddle Clip.
 - 3) Struct-Fast, Inc., Baltimore, MD; Gratefast.

2.06 FABRICATION

A. General:

1. In accordance with NAAMM MBG 531 or NAAMM MBG 532.
2. Conceal fastenings where practical.
3. Drill metalwork and countersink holes as required for attaching hardware or other materials.
4. Cutouts:
 - a. Fabricate in grating sections for penetrations indicated.
 - b. Arrange to permit grating removal without disturbing items penetrating grating.
 - c. Edge band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
5. Do not notch bearing bars at supports to maintain elevation.
6. Field measure areas to receive grating. Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
7. Section Length: Sufficient to prevent section from falling through clear opening when oriented in the span direction and one end is touching either the concrete or the vertical leg of grating support.
8. Minimum Bearing: 1 inch for grating depth up to 2-1/4 inches and 2 inches for grating depth greater than 2-1/4 inches.
9. Banding and Toe Plates: Same material as grating and welded to bearing bars in accordance with requirements of NAAMM MBG 531 and NAAMM MBG 532.

B. Metal Bar Grating: A single grating section shall be not less than 1.5 feet or greater than 3 feet in width, or weigh more than 150 pounds.

C. Heavy Duty Metal Bar Grating: Minimum width of grating sections shall be 2 feet regardless of length and weight.

D. Supports:

1. Same material as grating, except that supports which are to be embedded in concrete shall be Type 316 stainless steel, unless part of an extruded aluminum system.
2. Coordinate dimensions and fabrication with grating to be supported.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Until grating sections are securely fastened in place, area shall be appropriately barricaded or flagged to alert people working in the area of potential fall hazard.
- B. Install manufactured products in accordance with manufacturer's recommendations.
- C. Install supports such that grating sections have a solid bearing on both ends, and that grating sections will not rock or wobble under design loads.
- D. Install grating supports plumb and level as applicable.
- E. Install sections of welded frames with anchors to straight plane without offsets.
- F. Field locate and install fasteners to fit grating layout.
- G. Anchor grating securely to supports using minimum of four fastener clips and bolts per grating section.
- H. Each grating or plank section shall be easily removable and replaceable.
- I. Completed installation shall be rigid and neat in appearance.
- J. Protect painted and galvanized surfaces during installation.
- K. Repair damaged coatings as specified in Section 09 90 00, Painting and Coating.

END OF SECTION

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. D41, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - b. D449, Standard Specification for Asphalt Used in Dampproofing and Waterproofing.
 - c. D1227, Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
 - d. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 - e. D6380, Standard Specification for Asphalt Roll Roofing (Organic Felt).

1.02 SUBMITTALS

- A. Action Submittals: Manufacturer's product data for dampproofing materials.
- B. Informational Submittals:
 - 1. Manufacturer's current application instructions for dampproofing materials.
 - 2. Manufacturer's Certificate of Compliance.
 - 3. Statement of Qualification: Bituminous dampproofing installer.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Engage experienced installer who has completed bituminous dampproofing work similar in material, design, and extent for Project.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in area where temperatures are not less than 50 degrees F or over 85 degrees F.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Weather: Proceed with dampproofing Work only when existing and forecast weather conditions will permit Work. Do not apply dampproofing in rainy conditions or within 3 days after surfaces become wet from rainfall or other moisture.
- B. Temperature:
 - 1. Do not apply materials when ambient temperature is less than 50 degrees F.
 - 2. Do not apply materials when low temperature of 40 degrees F or less is predicted within a period of 24 hours after application.
- C. Ventilation: Provide adequate ventilation during application of solvent-based components in enclosed spaces. Maintain ventilation until dampproofing membrane has thoroughly cured.

PART 2 PRODUCTS

2.01 COLD-APPLIED ASPHALT EMULSION DAMPPROOFING

- A. Asphalt Emulsion: Asphalt and water emulsion coating, formulated to penetrate substrate and build to moisture-resistant coating.
 - 1. Semifibrated type semimastic asbestos-free emulsion; ASTM D1227, Type II, except containing nonasbestos fibrous reinforcement and filler materials.
- B. Manufacturers:
 - 1. Celotex Corp.
 - 2. ChemRex, Inc./Sonneborn Building Products Div.
 - 3. J & P Petroleum Products, Inc.
 - 4. Koch Materials Co.
 - 5. Tremco, Inc.

2.02 MISCELLANEOUS ACCESSORIES

- A. Protection Course, Board Type: Asphalt-impregnated and coated organic fiberboard, 1/2 inch thick.
- B. Protection Course, Roll Roofing Type: ASTM D6380, smooth-surfaced roll roofing weighing not less than 55 pounds per 100 square foot.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. Clean surfaces to remove dust, dirt, oil, wax, efflorescence, and other foreign materials, in accordance with dampproofing manufacturer's instructions.
- B. Allow 3 days' drying time following washing down of substrate surfaces.
- C. Fill cracks, voids, and honeycombs with mortar to provide sound surface for dampproofing.

3.02 APPLICATION

- A. Apply dampproofing with a brush, trowel, or low pressure airless spray equipment with a coarse nozzle, as recommended by dampproofing manufacturer.
- B. Apply materials at rate and as recommended by the manufacturer and in two coats.
- C. Start application at top of wall and work down surface, keeping a wet edge at all times, forming a continuous, unbroken film, free from pinholes and other surface breaks.

3.03 FIELD QUALITY CONTROL

- A. Inspection: Examine surfaces to receive dampproofing to assure conditions are satisfactory for application of materials.
- B. After dampproofing has dried spray surfaces with water.
- C. Recoat, as recommended by manufacturer, surfaces showing water absorption. To prevent blistering, protect surfaces from heat and direct sunlight until dried, then backfill.

3.04 ADJUST AND CLEAN

- A. Clean spillage and overspray from adjacent surfaces as recommended by manufacturer.

3.05 APPLICATION SCHEDULE

- A. Dampproof all belowgrade walls at transfer building, lower level.
- B. On belowgrade walls apply dampproofing from top of footings to 6 inches below finished grade.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. ASTM International (ASTM):
 - a. C272, Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
 - b. C303, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
 - c. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - d. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - e. D4397, Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
 - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - g. E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Manufacturer's product literature identifying products proposed for use.
 - b. Drawings or letter indicating proposed locations of holes for injection of foam-in-place insulation in exposed, unpainted walls.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. On packaging clearly identify manufacturer, contents, brand name, applicable standard, and R-value.
- B. Store materials off ground and keep them dry. Protect against weather, condensation, and damage.

PART 2 PRODUCTS

2.01 BATT INSULATION AND FASTENERS

- A. Fiberglass or Mineral Wool Batts:
 - 1. ASTM C665, Type III, Class B, with 0.5 perm rating, reflective aluminum foil vapor retarder membrane laminated to one side, with R-values as indicated on Drawings.
 - 2. Manufacturers:
 - a. CertainTeed Corp.
 - b. Owens-Corning Insulating Systems.
 - c. Johns Manville.
- B. Fasteners: As recommended by insulation manufacturer.
- C. Tape: As recommended by insulation manufacturer.

2.02 SILL SEALER

- A. Fiberglass or Mineral-fiber Insulation Rolls:
 - 1. Size: 1 inch thick by 6 inches wide.
 - 2. ASTM C665, Type I.
- B. Polyethylene Foam:
 - 1. Size: 5-1/2 inches wide.
 - 2. Manufacturers and Products:
 - a. Dow Chemical Company; Styrofoam Sill Seal.
 - b. TVM Building Products; TVM Sill Seal.

2.03 VAPOR RETARDER

- A. Plastic Sheeting: ASTM D4397, minimum thickness of 6 mils.
- B. Sealant and Tape: As recommended by vapor retarder manufacturer.

2.04 RIGID INSULATION

- A. Extruded Polystyrene Foam:
 - 1. ASTM C578, Type IV.
 - 2. Flame Spread: Less than 25 when tested in accordance with ASTM E84.
 - 3. R-value: As shown.
 - 4. Manufacturers and Products:
 - a. Dow Chemical Co.; Styrofoam Square Edge.
 - b. UC Industries; Foamular.

- B. Adhesives and Fasteners: As recommended by insulation manufacturer.

PART 3 EXECUTION

3.01 BATT INSULATION

- A. Install in accordance with manufacturer's instructions and as specified below:
 - 1. Install in widths required by framing spacing with vapor retarder facing warm side.
 - 2. Fit tightly to ensure continuous seal. Tape overlapping flanges of vapor retarder when necessary, using tape as recommended by insulation manufacturer.
 - 3. Where electrical outlets, ducts, pipes, vents, or other utility items occur, place insulation on cold weather side of obstruction.
 - 4. Protect installed insulation from tears and other damage until covered with finish material.
 - 5. Remove and replace damaged material.

3.02 SILL SEALER

- A. Install under wood plates resting on concrete or masonry walls.

3.03 VAPOR RETARDER

- A. Install in accordance with the following:
 - 1. Apply to wall and ceiling framing in sheets as large as possible.
 - 2. Lap joints 6 inches.
 - 3. Seal joints with sealant and tape as recommended by vapor retarder manufacturer.
 - 4. Fit tightly and seal around penetrations.
 - 5. Repair minor tears or holes with tape.
 - 6. Replace sheets with tears or holes, which require more than 6-inch length of tape to repair.

3.04 RIGID INSULATION

- A. Install in accordance with the following:
 - 1. Install boards in location and in R-value shown.
 - 2. Cut insulation with saw, knife, or other sharp tool to fit tightly around obstructions.
 - 3. Butt insulation boards together tightly at joints.

4. Where thickness required exceeds 1-1/2 inches, install two layers of boards.
5. Apply to masonry or concrete with fasteners recommended by insulation manufacturer.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, and Flat Bar.
 - d. A924/A924M Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - e. B32, Standard Specification for Solder Metal.
 - f. C920, Standard Specification for Elastomeric Joint Sealants.
 - g. C1311, Standard Specification for Solvent Release Sealants.
 - h. D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - i. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 2. Federal Specifications (FS): QQ-L-201F(2), Lead Sheet.
 3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual, 5th Edition.

1.02 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
- C. Meet wind load requirements of ASCE 7-05 and design criteria listed in Structural General Notes.

D. Thermal Movements:

1. Provide sheet metal flashing and trim that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
2. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
3. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
4. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

E. Water Infiltration: Provide sheet metal flashing and trim that does not allow water infiltration to building interior.

1.03 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown, unless more stringent requirements are indicated.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Show joints, types and location of fasteners, and special shapes.
 - b. Catalog data for stock manufactured items.
2. Samples: Color Samples for items to be factory finished.

1.05 DELIVERY, HANDLING, AND STORAGE

- A. Inspect for damage, dampness, and wet storage stains upon delivery to Work Site.
- B. Remove and replace damaged or permanently stained materials that cannot be restored to like-new condition.
- C. Carefully handle to avoid damage to surfaces, edges, and ends.
- D. Do not open packages until ready for use.
- E. Store materials in dry, weathertight, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.01 METAL

- A. Prefinished Galvanized Steel Sheet: ASTM A924/A924M, Grade A or ASTM A653/A653M, G90 zinc coating; 24-gauge (0.02-inch) core steel, shop prefinished with Kynar polyvinylidene fluoride resin coating; color as scheduled in Exterior Finish Schedule.

2.02 DOWNSPOUTS, GUTTERS, SCUPPERS, AND CONDUCTOR HEADS

- A. Same metal and thickness as flashing.

2.03 ANCILLARY MATERIALS

- A. Solder: ASTM B32, alloy composition Sn 50.
- B. Soldering Flux: ASTM B32, Type RA.
- C. Sealing Tape: Polyisobutylene sealing tape.
- D. Isolation Paint: As specified in Section 09 90 00, Painting and Coating.
- E. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.
- F. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- G. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- H. Fasteners:
 - 1. For Galvanized Steelwork: Steel, galvanized per ASTM A153/A153M or stainless steel fasteners.
 - 2. For Zinc or Aluminum Work: Stainless steel or aluminum; reglet fasteners may be galvanized or cadmium-plated steel.
 - 3. For Stainless Steelwork: Stainless steel.
 - 4. For Copperwork: Copper or copper alloy.
 - 5. Nails: Roofing nailhead, 10-gauge spiral or ring shank, lengths as required to penetrate wood at least 3/4 inch or as required in Article Performance Requirements.

2.04 FABRICATION OF FLASHING

- A. Field measure prior to fabrication.
- B. Fabricate in accordance with SMACNA Architectural Sheet Metal Manual that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Formed Metal Copings: Figure 3-1.
 - 2. Counter Flashing Systems: Figure 4-3.
 - 3. Roof Penetration Flashings: Figures 4-13, 4-14, 4-15, 4-16, and 4-17.
- C. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- D. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
- E. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- F. Reinforcements and Supports: Provide same material as flashing, unless other material is shown. Steel, where shown or required, shall be galvanized or stainless.
- G. Rigid Joints and Seams: Make mechanically strong. Solder galvanized steel metal joints. Do not use solder to transmit stress.
- H. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- I. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.
- J. Fabricate sheet metal in 10-foot maximum lengths, unless otherwise indicated.
- K. At exposed ends of counterflashing furnish watertight closures.
- L. Fabricate corners in one-piece with legs extending 30 inches each way to field joint. Lap, rivet, or solder corner seams watertight. Apply sealant if necessary.
- M. Neutralize soldering flux.

- N. Solvent clean sheet metal. Surfaces to be in contact with roofing or otherwise concealed shall be coated with isolation paint.
- O. Pipe Penetrations through Roof: As specified in Section 07 70 01, Roof Specialties and Accessories.
- P. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- Q. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

2.05 FABRICATION OF DOWNSPOUTS AND GUTTERS

- A. Form downspouts and gutters in maximum lengths as practicable to sizes and shapes indicated on Drawings:
 - 1. Telescope end joints 1-1/2 inches and lock longitudinal joints of downspouts.
 - 2. Furnish elbows at bottom where downspouts empty onto splash blocks.
 - 3. Fit downspouts into cast iron boots or drainpipes where indicated on Drawings; neatly caulk or cement joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, and cant strips and reglets in place.
- B. Verify nailing strips and blocking are properly located.
- C. Verify membrane termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION

- A. Flashing:
 - 1. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to

line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

2. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - a. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16-inch centers.
3. Isolate metal from wood and concrete and from dissimilar metal with isolation tape or two coats of isolation paint.
4. Use only stainless steel fasteners to connect isolated dissimilar metals.
5. Joints: 10-foot maximum spacing and 2-1/2 feet from corners, butted with 3/16-inch space centered over matching 8-inch-long backing plate with sealing tape in laps.
6. Joints, Fastenings, Reinforcements, and Supports: Sized and located as required to preclude distortion or displacement due to thermal expansion and contraction.
7. Conceal fastenings wherever possible.
8. Set flashing and sheet metal to straight, true lines with exposed faces aligned in proper plane without bulges or waves.

B. Prefabricated Metal Systems:

1. Follow system manufacturer's printed instructions.
2. Place color variations in pieces so no extremes are next to each other.

C. Downspouts and Gutters: Anchor downspouts to wall with straps of same material as downspouts. Install gutters, scuppers, and conductor heads as indicated on Drawings.

3.03 FINISH

- A. Exposed Surfaces of Flashing and Sheet Metalwork: Free of dents, scratches, abrasions, or other visible defects, and clean and ready for painting where applicable.

3.04 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 70 01
ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. Air Movement and Control Association International (AMCA).
2. American Architectural Manufacturers Association (AAMA).
3. ASTM International (ASTM):
 - a. D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - b. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
4. FM (Factory Mutual) Global (FMG).
5. Underwriters Laboratories Inc. (UL).

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings of each item specified showing materials, details, flashing, anchorage, and relation to adjacent structure.
2. Catalog cuts of each item specified item.

1.03 SEQUENCING AND SCHEDULING

A. Coordination: Schedule and coordinate Work of this Section with Work of Section 07 62 00, Sheet Metal Flashing and Trim.

PART 2 PRODUCTS

2.01 PIPE SEALS

A. Prefabricated one-piece aluminum flanged base with stepped, graduated EPDM cap and adjustable stainless steel clamps.

B. Manufacturers and Products:

1. Pate Co.; Pipe Seal.
2. Portals Plus, Inc.; Alumi-Flash.

2.02 FLEXIBLE BASE PIPE SEALS

- A. Prefabricated one-piece aluminum flanged base with stepped, graduated EPDM cap and adjustable stainless steel clamps. Aluminum base shall be capable of bending to match profile of sheet metal roofing panels.
- B. Manufacturers and Products:
 - 1. Pate Co.; Dektite.
 - 2. Portals Plus, Inc.; Deck-Mate.

2.03 VENT PIPE FLASHING

- A. Prefabricated flashing with elastomeric collar and 24-gauge galvanized steel base, sized to fit vent pipe.
- B. Manufacturer and Product: Oatey; No-Caulk Roof Flashing.

2.04 SNOW GUARDS

- A. Manufacturers and Products:
 - 1. Snowblox; Ace or Deuce model.
 - 2. Zaleski; Model No. 15.
 - 3. Berger Bros. Co.; AP, SM, or RTCLSM.
 - 4. M.J. Mullane Co.; Model 640.

2.05 ANCILLARY MATERIALS

- A. Isolation Paint: As specified in Section 09 90 00, Painting and Coating.
- B. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil-thick minimum polyester.
- C. Fasteners: Stainless steel of type required.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine surfaces and structures to receive the Work of this Section.
- B. Take measurements at Site and fabricate work to suit. No changes shall be made in supporting structure to accommodate this Work.

3.02 INSTALLATION

A. General:

1. Install roof specialties and accessories as detailed in approved Shop Drawings and in conformance with manufacturer's instructions, recommendations, and standards.
2. Use appropriate pipe curb assembly, pipe seal, flexible base pipe seal, or vent pipe flashing where pipe, conduit, or cable, etc., penetrate roofing membrane.
3. Factory Finished Units: Place color variations in pieces so no extremes are next to each other.
4. Make Work weathertight and free of expansion and contraction noise.
5. Maintain separation between aluminum surfaces and concrete or dissimilar metals as specified in Section 09 90 00, Painting and Coating.

- B. Snow Guards: Install in strict accordance with manufacturer's written instructions, including recommended spacing for roof type, slope, and location, and attachment method.

END OF SECTION

SECTION 07 92 00 JOINT SEALANTS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. ASTM International (ASTM):
 - a. C661, Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
 - b. C834, Standard Specification for Latex Sealants.
 - c. C920, Standard Specification for Elastomeric Joint Sealants.
 - d. C1193, Standard Guide for Use of Joint Sealants.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Surface preparation instructions. Indicate where each product is proposed to be used.
2. Samples: Material proposed for use showing color range available.

B. Informational Submittals:

1. Installation instructions.
2. Documentation showing applicator qualifications.
3. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services.
4. Special guarantee.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Ambient Temperature: Between 40 degrees F and 80 degrees F (4 degrees C and 27 degrees C) when sealant is applied. Consult manufacturer when sealant cannot be applied within these temperature ranges.

PART 2 PRODUCTS

2.01 SEALANT MATERIALS

A. Characteristics:

1. Uniform, homogeneous.
2. Free from lumps, skins, and coarse particles when mixed.

3. Nonstaining, nonbleeding.
 4. Hardness of 15 minimum and 50 maximum, measured by ASTM C661 method.
 5. Immersible may be substituted for nonimmersible.
- B. Color: Unless specifically noted, match color of the principal wall material adjoining area of application.
- C. Type 1—Silicone, Nonsag, Nonimmersible:
1. Silicone base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
 2. Capable of withstanding movement up to 50 percent of joint width.
 3. Manufacturers and Products:
 - a. Dow Corning Corp.; No. 790.
 - b. General Electric; Silpruf.
 - c. BASF; Sonneborn, Omniseal-50.
- D. Type 2—Multipart Polyurethane, Self-leveling, Immersible:
1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade P, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturers and Products:
 - a. BASF; Sonneborn, SL-2.
 - b. Pecora Corp.; Urexspan NR-200.
 - c. Tremco; THC-900/901.
 - d. Sika Chemical Corp.; Sikaflex 2c SL.
- E. Type 3—Multipart Polyurethane, Nonsag, Immersible:
1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade NS, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturers and Products:
 - a. Pecora; DynaTrol II.
 - b. Tremco; Dymeric 240.
 - c. BASF; Sonneborn NP-2.
 - d. Sika Chemical Corp.; Sikaflex 2c NS.
- F. Type 4—Multipart Polyurethane, Nonsag, Nonimmersible:
1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade NS, Class 25.

2. Manufacturers and Products:
 - a. BASF; Sonneborn NP-2.
 - b. Pecora Corp.; Dynatrol II.
 - c. Tremco; Dymeric 240.
 - d. Sika Chemical Corp.; Sikaflex 2c NS.
- G. Type 5—One-part Polyurethane, Immersible:
1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS or P, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturers and Products for Nonsag:
 - a. Sika Chemical Corp.; Sikaflex-1a.
 - b. Tremco; Vulkem 116.
 4. Manufacturers and Products for Self-leveling:
 - a. BASF; Sonneborn, SL-1.
 - b. Tremco; Vulkem 45.
 - c. Sika Chemical Corp.; Sikaflex 1c SL.
- H. Type 6—One-Part Polyurethane, Nonimmersible:
1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
 2. Manufacturers and Products:
 - a. Pecora Corp.; Dynatrol 1 XL.
 - b. Tremco; Dymonic.
 - c. BASF; Sonneborn, NP-I.
- I. Type 10—Sanitary Sealant:
1. Silicone sealant similar to Type 1, above, formulated to resist mold growth and repeated exposure to high humidity while retaining adhesion, flexibility, and color.
 2. Manufacturers and Products:
 - a. Dow Corning; 786.
 - b. General Electric; Sanitary Sealant SCS1700.
- J. Type 11—Fire Penetration Seal:
1. Manufacturers and Products:
 - a. 3M Corp.; Fire Barrier Caulk CP25 and Putty 303.
 - b. General Electric; Pensil Sealant or Foam.
 - c. Unifrax Corporation; Fyre Putty.
 - d. Hilti USA; CP 604.

- K. Type 12—One-Part Polycarbonate, Immersible:
1. Polycarbonate base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturer and Product: Pro-Seal Products, Inc.; Pro-Seal 34.
- L. Type 13—Tape Sealant:
1. Compressible polyurethane foam impregnated with polybutylene or polymer-modified asphalt.
 2. Color: Black.
 3. Size: 3/4 inch wide by length required by expanded thickness recommended by manufacturer for particular application.
 4. Manufacturers and Products:
 - a. Emseal Joint Systems, Ltd.; AST—High Acrylic.
 - b. Dayton Superior; Polytite Standard.
 - c. PARR Technologies; PARR Sealant EP-7212-T.

2.02 BACKUP MATERIAL

- A. Nongassing, extruded, closed-cell round polyurethane foam or polyethylene foam rod, compatible with sealant used, and as recommended by sealant manufacturer.
- B. Size: As shown or as recommended by sealant material manufacturer. Provide for joints greater than 3/16 inch wide.
- C. Manufacturers and Products:
1. Sonneborn; Sonolastic Closed-cell Backing Rod.
 2. Tremco; Closed-cell Backing Rod.
 3. Pecora Corporation; Green Rod.

2.03 ANCILLARY MATERIALS

- A. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Primer: Nonstaining type recommended by sealant manufacturer to suit application.

2.04 PREFORMED SEALS

A. Preformed Compressible Joint Seals:

1. Widths Up to 5 Inches:
 - a. BASF, Watson Bowman Acme Div.; Wabo Weatherseal II.
 - b. Emseal Joint Systems Limited; Colorseal.
 - c. LymTal International; Iso-flex Joint System.
2. Other Widths: Series or model recommended by seal manufacturer.

PART 3 EXECUTION

3.01 GENERAL

- A. Use of more than one material for the same joint is not allowed unless approved by sealant manufacturer.
- B. Install joint sealants in accordance with ASTM C1193.
- C. Horizontal and Sloping Joints up to 1 Percent Maximum Slope: Use self-leveling (Grade P) joint sealant.
- D. Steeper Sloped Joints, Vertical Joints, and Overhead Joints: Use nonsag (Grade NS) joint sealant.
- E. Use joint sealant as required for the applicable application and as follows:

Joint Size	Sealant Type
Less than 1"	1, 2, 3, 4, 5, or 6
Less than 2"	1, 2, 3, or 4
Over 2"	Follow manufacturer's recommendation

3.02 PREPARATION

- A. Verify that joint dimensions, and physical and environmental conditions, are acceptable to receive sealant.
- B. Surfaces to be sealed shall be clean, dry, sound, and free of dust, loose mortar, oil, and other foreign materials.
 1. Mask adjacent surfaces where necessary to maintain neat edge.
 2. Starting of Work will be construed as acceptance of subsurfaces.
 3. Apply primer to dry surfaces as recommended by sealant manufacturer.
- C. Verify joint shaping materials and release tapes are compatible with sealant.

- D. Examine joint dimensions and size materials to achieve required width/depth ratios.
- E. Follow manufacturer's instructions for mixing multi-component products.

3.03 INSTALLATION

- A. Use joint filler to achieve required joint depths, to allow sealants to perform intended function.
 - 1. Install backup material as recommended by sealant manufacturer.
 - 2. Where possible, provide full length sections without splices; minimize number of splices.
 - 3. Tape sealant may be used as joint filler if approved by sealant manufacturer.
- B. Use bond breaker where recommended by sealant manufacturer.
- C. Seal joints around window, door and louver frames, expansion joints, control joints, and elsewhere as indicated.
- D. Joint Sealant Materials: Follow manufacturer's recommendation and instructions, filling joint completely from back to top, without voids.
- E. Joints: Tool slightly concave after sealant is installed.
 - 1. When tooling white or light color sealant, use a water wet tool.
 - 2. Finish joints free of air pockets, foreign embedded matter, ridges, and sags.
- F. Tape Sealant: Compress to 50 percent of expanded thickness and install in accordance with manufacturer's instructions.

3.04 PREFORMED SEALS

- A. Prepare joint surfaces clean and dry, free from oil, rust, laitance, and other foreign material.
- B. Construct joints straight and parallel to each other and at proper width and depth.
- C. Apply joint sealant manufacturer's approved primer and adhesive in accordance with manufacturer's instructions.
- D. Install seal in accordance with manufacturer's instructions.

3.05 CLEANING

- A. Clean surfaces next to the sealed joints of smears or other soiling resultant of sealing application.
- B. Replace damaged surfaces resulting from joint sealing or cleaning activities.

3.06 JOINT SEALANT SCHEDULE

- A. This schedule lists the sealant types acceptable for each joint location. Use as few different sealant types as possible to meet the requirements of Project.

Joint Locations	Sealant Type(s)
Expansion/Contraction and Control Joints At:	
Concrete Walls (except water-holding and belowgrade portions of structures)	1, 3, 4, 5, 6, 12
Concrete Floor Slabs (except for water-holding Structures)	2, 5
Slabs Subject to Vehicle and Pedestrian Traffic	2, 5
Material Joints At:	
Metal Door, Window, and Louver Frames (Exterior)	1, 5, 6, 12
Metal Door, Window, and Louver Frames (Interior)	1, 5, 6
Wall Penetrations (Exterior)	1, 5, 6, 12
Wall Penetrations (Interior)	1, 5, 6
Floor Penetrations	5, 6
Ceiling Penetrations	1, 3, 4, 5, 6
Roof Penetrations	5
Sheet Metal Flashings	5, 13
Sheet Metal Roofing and Siding	5, 13
Other Joints:	
Threshold Sealant Bed	5
Between Counter Tops and Backsplashes	10
Around Plumbing Fixtures	10

Joint Locations	Sealant Type(s)
Openings Around Pipes, Conduits, and Ducts Through Fire-Rated Construction	11
Concrete Form Snap-Tie Holes	1, 4, 5

END OF SECTION

SECTION 08 11 01
STEEL DOOR ASSEMBLIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI):
 - a. A250.6, Hardware on Standard Steel Doors (Reinforcement - Application).
 - b. A250.8, Recommended Specifications for Standard Steel Doors and Frames.
 - c. A250.11, Recommended Erection Instructions for Steel Frames.
2. ASTM International (ASTM):
 - a. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
3. Builders Hardware Manufacturers Association (BHMA):
 - a. A156.1, Butts and Hinges.
 - b. A156.4, Door Controls - Closers.
 - c. A156.13, Mortise Locks & Latches.
 - d. A156.16, Auxiliary Hardware.
 - e. A156.18, Materials and Finishes.
 - f. A156.115, Hardware Preparations in Standard Steel Doors and Frames.

1.02 SUBMITTALS

A. Action Submittals:

1. Show door and frame construction and anchorage details.
2. Complete Hardware Schedule, including numbers and finishes.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Provide packaging such as cardboard or other containers, separation, banding, and wrappings.
- B. Store doors upright, inside, at least 1 inch off floor.

1.04 EXTRA MATERIALS

- A. Special Tools: Furnish two sets of those required for installation, maintenance, or adjustment.

PART 2 PRODUCTS

2.01 DOOR AND FRAME MATERIALS

- A. Sheet Steel for Doors and Frames: Cold-rolled, stretcher level sheet, ASTM A1008/A1008M.
- B. Ancillary Items: Manufacturer's standard core filler, anchors, and fasteners.

2.02 HARDWARE MATERIALS

- A. General:
- Furnish finish hardware with suitable stainless steel fasteners for complete installation.
 - Products complete and of equal quality and finish.
- B. Butt Hinges: BHMA A156.1. Stainless steel.

Type	Item	ANSI/ BHMA	Stanley	McKinney
H1	Regular, ball bearing	A2112	FBB191	TB2314
H2	Plain bearing	A5133	F179	T2714
H3	Heavyweight, four ball-races	A5111	FBB199-32D	T4B3386

- C. Locks and Latches: BHMA A156.13 Series 1000, Grade 1, keying on schedule; furnish two keys for each lock and two master keys.

Type	Item	ANSI/ BHMA	Schlage	Sargent	Best
L1	Mortise entrance lock with lever handle	F12, F13	L9456P-03	8245-LNJ	45HYTA3H
L2	Mortise latch with lever handle	F01	L9010-03	8215-LNJ	45HON3H

D. Closers: BHMA A156.4 with painted finish.

Type	Item	ANSI/ BHMA	LCN	Sargent
C1	Regular arm	C02011	4010	350
C2	Parallel arm	C02021	4110	350-P
C3	Parallel arm with integral stop	C02021	4110 Cushion Stop Series	351-PS Series
C4	Parallel arm, with integral stop and hold open	C02061	41110H Cushion Stop Series	351-PSH Series

E. Stops: BHMA A156.16.

Type	Item	ANSI/BHMA	Builder's Brass	Baldwin
S1	Floor stops	L02131	F121X	4086
S2	Wall bumper	L02251	WC9X	4031

F. Bolts: BHMA A156.16. Finish bright nickel No. 645.

Type	Item	Stanley	Lawrence	BHMA
B1	Top: 8" bolt with 48" chain	1055	T146	
	Bottom: 8" foot- bolt or surface bolt	1056 4060	T145 283	

G. Thresholds:

Type	Item	ANSI/BHMA	Pemco	Reese
T1	Saddle	--	175A	S104A
T2	Thermal break saddle (6-1/8")	--	253XAFG	S473A

H. Weatherstripping:

Type	Item	ANSI/BHMA	Pemco	Reese
W1	Head and jamb Door shoe Rain drip	--	S88D 222AV 346C	797B DB596AF R201C
W2	Head and jamb Door shoe	--	PF114PS 222AV	794B DB596AF

- I. Finishes: BHMA A156.18, satin chromium-plated No. 626, unless indicated otherwise.
- J. Nameplates: Beveled edge plastic plate, 1/8-inch thick, 2-inch high black, with 1-inch high white Helvetica letters with text as scheduled.

2.03 DOOR AND FRAME FABRICATION

- A. Hollow Metal Doors and Frames: Meet requirements of BHMA A156.115, ANSI A250.6, and ANSI A250.8.
- B. Hollow Metal Doors:
1. Flush end closure on top.
 2. Furnish overlapping astragal on active leaf of exterior pairs of doors.
 3. Rust-inhibiting prime coating over ASTM A653/A653M A60 zinc coating.
 4. Exterior: ANSI A250.8, Level 3, Model 1, 16-gauge.
 5. Interior: ANSI A250.8, Level 2, Model 1, 18-gauge.
 6. Transom Panels: Match doors.
 7. R-Value at Exterior Doors: 7.5.
- C. Hollow Metal Frames:
1. Knockdown or welded type.
 2. Exterior Frame Thickness: 14-gauge.
 3. Interior Frame Thickness: 16-gauge.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate doors, frames, and hardware.
- B. Provide hardware templates as required to door and frame manufacturers.

3.02 FRAME AND DOOR INSTALLATION

- A. Frames: Plumb and square, in accordance with ANSI A250.11 and manufacturer's recommendations, and secure to adjacent construction.
- B. Doors: ASTM A250.8.
- C. Remove labels from glass, wash and polish both faces.
- D. Leave clean and undamaged.
- E. Touch up prime coating.

3.03 HARDWARE INSTALLATION

- A. Mounting Dimensions: Follow BHMA Standard; lock and latch backset, 2-3/4 inches.
- B. Follow manufacturer's instructions. Make Work neat and secure, developing full strength of components and providing intended function.
- C. Prevent marring, scratching, or otherwise damaging adjacent finishes during installation.
- D. Set stops over solid backing after painting is complete.
- E. Cope ends of thresholds neatly to jamb profile and set in sealant, anchoring securely.
- F. Do fitting, dismantling, and reinstalling of finish hardware required before and after painting.
- G. After installation, adjust hardware for noise-free operation without resistance.

3.04 PROTECTION

- A. Protect doors, frames, and hardware from damage after installation.

3.05 HARDWARE SETS

- A. Hardware sets are guide to functional requirements of each opening. Provide hardware complete. Size omitted shall be as recommended by manufacturer.

Item	Type
HDW-1. Single Locked Entrance Door	
1-1/2 Pair butts, 4-1/2 by 4-1/2	H1
1 Lock	L1
1 Closer with integral stop	C3
1 Threshold	T2
1 Set weatherstrip	W1
HDW-2. Connecting Interior Door, With Lock	
1-1/2 Pair butts, 4-1/2 by 4-1/2	H1
1 Lock	L1
1 Floor stop	S1
1 Closer	C2
1 Threshold	T1
1 Weatherstrip	W2
HDW-3. Store Room, No Lock	
1-1/2 Pair butts, 4-1/2 by 4-1/2	H2
1 Lock	L2
1 Floor stop	S1
HDW-4. Double Doors With Lock	
4 Pair butts, 5 x 4-1/2	H3
1 Lock	H1
2 Closers with integral stop and hold open	C4
1 Set top and bottom bolts	B1

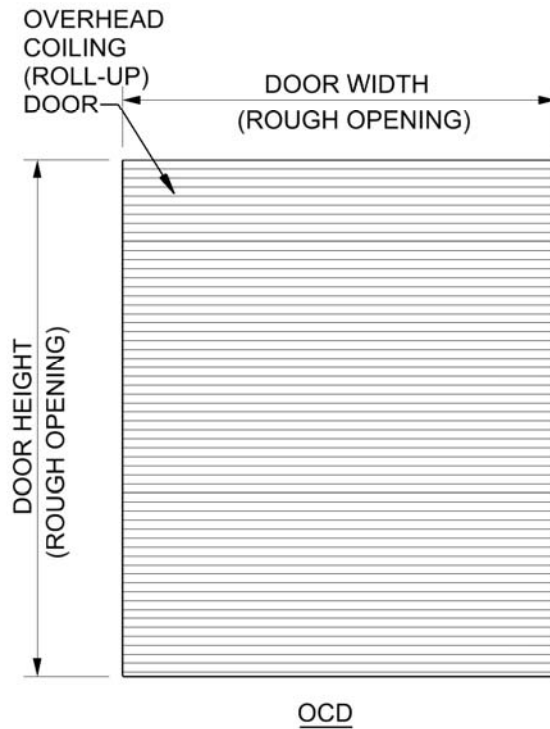
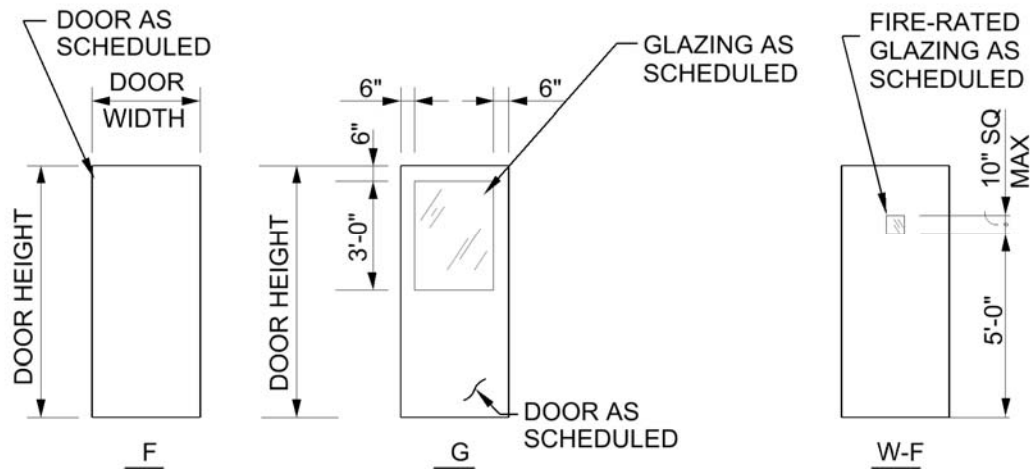
Item	Type
1 Threshold	T2
1 Set weatherstrip	W2

3.06 SUPPLEMENT

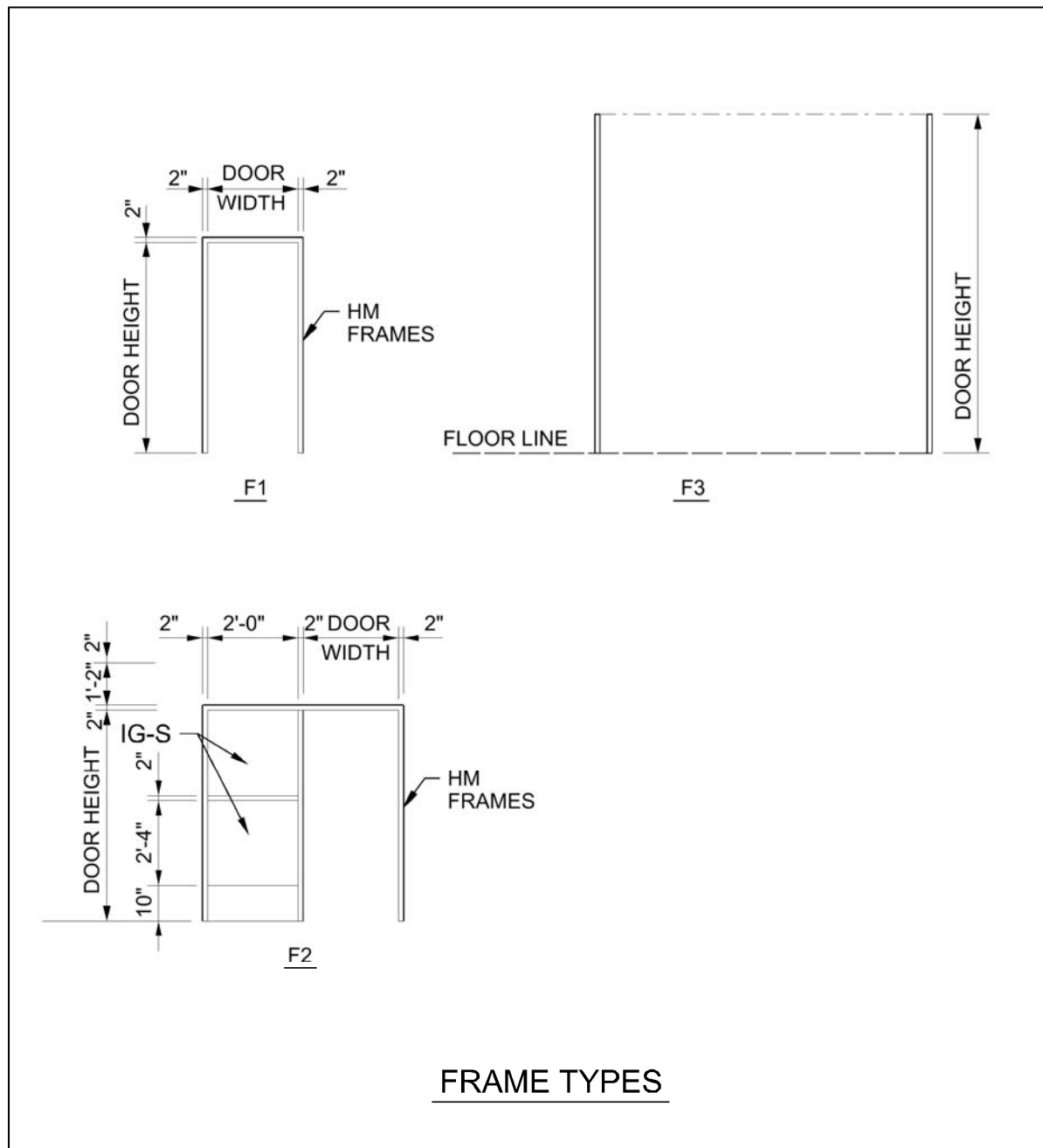
A. The supplement listed below, following “End of Section,” is a part of this Specification:

1. Door and Frame Types.

END OF SECTION



DOOR TYPES



**SECTION 08 30 00
SPECIALTY DOORS**

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. The Aluminum Association, Incorporated (AA): Designation System for Aluminum Finishes.
2. American Iron and Steel Institute (AISI).
3. American Society of Mechanical Engineers (ASME): Boiler and Pressure Vessel Code, Section VIII, Division 1, Appendix VIII.
4. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - c. A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
 - d. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - e. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - f. B308/B308M, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
 - g. C1363, Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
5. National Electrical Manufacturers' Association (NEMA): 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
6. National Fire Protection Association (NFPA): 70, National Electrical Code.
7. Underwriters Laboratories Inc. (UL): Building Materials Directory.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Shop Drawings showing construction and installation details, and electrical characteristics and control diagrams for motor operators.
 - b. Identify each door with same reference as used on Drawings.

2. Samples: Manufacturer's current color sample(s) for factory finished coatings.

B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Seismic Anchorage and Bracing.
2. Watertight Door: Furnish manufacturer's certification of leak tightness based on actual tests conducted on this door, or a door similar in design, to verify it will withstand specified hydrostatic pressure with no evident leakage.

1.03 QUALITY ASSURANCE

- A. Qualifications: Experienced, factory authorized installer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors with separators and wrapping to protect units from damage during and after installation.
- B. Store doors in protected dry area following manufacturer's requirements.
- C. Handle doors according to manufacturer's instructions.
- D. Protect exposed finish surfaces of prefinished items with wrapping.

PART 2 PRODUCTS

2.01 OVERHEAD COILING (ROLLUP) DOORS

A. Manufacturers:

1. Alpine Overhead Doors, Inc.
2. Apton Rolling Doors.
3. Cornell Iron Works, Inc.
4. Kinnear, Division of Wayne-Dalton Corp.
5. Mahon Door Corp.
6. North American, Division of Wayne-Dalton Corp.
7. Overhead Door Corp.
8. Pacific Rolling Door Co.
9. The Cookson Co.
10. CECO/Windsor Door.

- B. Design Requirement: Complete assembly, each component and anchorage to building to withstand a wind load of 30 pounds per square foot.

- C. Noninsulated Curtain: Interlocking flat slats of 20-gauge (U.S. Standard) minimum steel.
- D. Hood: Match curtain material and finish.
- E. Slide Guides: ASTM A36/A36M steel, shapes as appropriate for conditions.
- F. Brackets, Gears, and Barrel: Manufacturer's standard items.
- G. Operation:
 - 1. Motor operated worm and gear to chain drive with pushbutton stations and endless chain or handcrank for emergency operation. Motor, UL listed and rated 460 volts, three-phase.
 - 2. Provide NEMA 250 Type 4X, watertight and corrosion-resistant enclosures for operator controls and stations.
 - 3. Where indicated on the Door and Hardware Schedule, provide electric wiring and equipment meeting requirements of NFPA 70 for location hazard classification noted.
- H. Locking: Manufacturer's standard slide bolt locking mechanism.
- I. Finish:
 - 1. Steel Curtain Slats Guides, Hood, and Brackets: Hot-dip galvanize with G90 zinc coating in accordance with ASTM A653, phosphate treat for paint adhesion, and prime coat with corrosion-inhibiting primer compatible with finish paint specified in Section 09 90 00, Painting and Coating, in color as selected from manufacturer's standard range.
 - 2. Other Steel Surfaces Including Guides and Brackets: One coat of corrosion-inhibiting prime paint compatible with finish paint specified in Section 09 90 00, Painting and Coating.
- J. Special Features:
 - 1. Bottom Bar:
 - a. Provide galvanized steel bottom bar with flexible weatherstripping astragal on exterior doors.
 - b. Finish to match curtain slats.
 - c. Provide limit switch and automatic stop and reversing feature in astragal.
 - 2. End Locks and Wind Locks:
 - a. Ends of each slat shall have end locks of material compatible with curtain.
 - b. Provide wind locks at ends of every other slat minimum on exterior doors.

3. Weather Seals:
 - a. Provide rubber, neoprene, or vinyl water seal at hood to prevent airflow around coil on exterior doors.
 - b. Provide weather seal sealing strip on guide to close space between guide and curtain on exterior doors.
4. Vision Panels: Manufacturer's glazed vision panels where indicated on Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install special doors in accordance with the manufacturer's recommendations and printed instructions.
- B. Provide pushbutton operators inside doors.
- C. Adjust doors for smooth, satisfactory operation.

3.02 PRIME COAT TOUCHUP

- A. Damaged Prime Coat:
 1. Remove rust.
 2. Sand smooth.
 3. Use same primer as shop.
 4. Touch up so it is not obvious.

3.03 PROTECTION

- A. Protect installed doors against damage from other construction work.

3.04 SCHEDULE

- A. For tabulation of door and frame characteristics, such as size, type, detail, and finish hardware requirements, see Door and Hardware Schedule on Drawings.

END OF SECTION

SECTION 09 22 16
NONSTRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. C645, Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
 - b. C754, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum.

1.02 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - 2. Seismic anchorage and bracing drawings, as required by Section 01 88 15, Seismic Anchorage and Bracing.
- B. Informational Submittals: Seismic anchorage and bracing calculations as required by Section 01 88 15, Seismic Anchorage and Bracing.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in manufacturer's original, unopened, undamaged containers, with labels intact clearly indicating manufacturer and material.
- B. Storage:
 - 1. Store materials inside, under cover, stacked flat, off floor.
 - 2. Avoid overloading floor system of storage area.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. National Gypsum Company; Gold Bond.
- B. Dale/Incor.

- C. G-P Gypsum Corporation.
- D. United States Gypsum Company.

2.02 MATERIALS

- A. Furnish materials from a single manufacturer.
- B. Studs, Tracks, Furring Channels, and Accessories:
 - 1. ASTM C645.
 - 2. 25- and 20-gauge galvanized steel C-studs with 1-5/8-inch flanges and ancillary items.
 - 3. Sizes as shown on Drawings.
- C. Carrying Channels: Cold-rolled steel, 16-gauge, free of rust, coated with factory-applied rust-inhibitive paint, 1-1/2 inches deep, weighing not less than 475 pounds per 1,000 linear feet.
- D. Furring Channels: Roll-formed hat shaped section of 25-gauge galvanized steel with a face width of 1-3/8 inches and a depth of 7/8 inch.
- E. Resilient Furring Channels:
 - 1. Roll-formed section of 25-gauge galvanized steel with face width of 1-1/2 inches designed for resilient attachment of gypsum board to framing.
 - 2. Manufacturers and Products:
 - a. United States Gypsum; RC-1 channel.
 - b. Gold Bond; resilient channels.
- F. Z Furring Channels: U.S. Gypsum or Gold Bond.

PART 3 EXECUTION

3.01 ERECTION

- A. Preparation: Provide, install, and maintain necessary scaffold, staging, trestles, planking, and temporary heating, lighting, and ventilation as necessary for the duration of the gypsum board work.
- B. Field Measurements: Take and record measurements before fabrication of assemblies.
- C. Layout: Align partitions as shown on Drawings.

D. Tracks:

1. Attach metal runner tracks to floor slabs with suitable fasteners located 2 inches from each end and spaced not more than 24 inches OC.
2. Attach tracks to suspended ceiling with toggle or molly bolts spaced 24 inches OC.

E. Studs and Other Framing:

1. ASTM C754.
2. Following manufacturer's printed instructions, position studs vertically, engaging floor and ceiling tracks and spaced as noted on Drawings.
3. Splices: Not allowed.
4. Place in direct contact with doorframe jambs, abutting partitions, and partition corners. Provide for anchorage of doorframes to studs.
5. Anchor all studs for shelf-walls and those adjacent to window and doorframes, partition intersections, and corners to ceiling and floor runner flanges. Securely anchor studs to jamb and head anchor clips of door or borrowed-light frames by bolt or screw attachment.
6. Over metal door and borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flanged bend at each end, and secure with one positive attachment per flange. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over doorframe header.
7. Locate studs at abutting construction, partition intersections, and partition corners.
8. Spacing: 16 inches OC, unless otherwise required by manufacturer.
9. Doorframes and Cased Openings:
 - a. Full height double studs, No. 20-gauge minimum, secured to jamb anchors by bolts, screws, or welds.
 - b. Header Track: Secure to frame head anchors and double studs.
 - c. Provide double channel stiffeners through studs above frame and extend at least one stud space beyond each jamb.
10. Windows: Similar framing to door openings with stiffeners both above and below.
11. Wall Mounting Accessories: Provide channels, horizontal studding, No. 16-gauge sheet 8 inches by 2 inches greater than stud spacing, or other members within walls as required to provide secure and adequate support.

F. Furring:

1. Space furring channels the same as studs or as shown.
2. Around columns and beams construct furring as shown using metal studs and furring channels securely tied together and anchored in-place.
3. Attach resilient furring channels to wood framing with screws.

- G. Leave framing, plumb, aligned, securely anchored, braced, and ready to receive gypsum board.

END OF SECTION

SECTION 09 29 01 GYPSUM BOARD

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. C475, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - b. C514, Standard Specification for Nails for the Application of Gypsumboard.
 - c. C840, Standard Specification for Application and Finishing of Gypsum Board.
 - d. C1002, Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.
 - e. C1047, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - f. C1396, Specification for Gypsum Board.
 - 2. Gypsum Association (GA):
 - a. 214, Levels of Gypsum Board Finishes.
 - b. 216, Recommended Specifications for Application and Finishing of Gypsum Board.

1.02 ENVIRONMENTAL CONDITIONS

- A. Temperature: Maintain between 55 degrees F and 70 degrees F for 24 hours before, during, and after application and finishing.
- B. Ventilation: Provide ventilation, but protect from drafts during hot, dry weather.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fire-Rated Board (GWBX): ASTM C1396, Type X, 5/8 inch thick with tapered edges.
- B. Regular Board (GWB): ASTM C1396, 1/2 inch thick with tapered edges.
- C. Gypsum Soffit Board (GSB): ASTM C1396, Type X, 5/8 inch thick tapered or rounded.

D. Fasteners:

1. Nails: ASTM C514, smooth shank, 1-1/2 inches.
2. Screws: ASTM C1002, Type W or S, 1-1/4 inches.

E. Joint Treatment:

1. Tape: ASTM C475, perforated; 2 inches wide 10 by 10 glass mesh tape for soffit board.
2. Compound: ASTM C475, all-purpose, ready-mixed.

F. Metal Accessories:

1. ASTM C1047, galvanized metal.
2. Corner Bead: ASTM C840, Figure 1, CB114X114.
3. Edge Trim: ASTM C840, Figure 1, L12 or L-58.

2.02 SPRAY TEXTURE

A. Interior Ceilings:

1. United States Gypsum; Imperial QT texture finish with perlite aggregate.
2. Gold Bond; Perfect Spray.

B. Interior Walls:

1. United States Gypsum; Texture I sand finish.
2. Gold Bond; Wall Spray texture finish.

PART 3 EXECUTION

3.01 APPLICATION OF GYPSUM BOARD

A. Inspection:

1. Verify that framing is aligned, spaced correctly, and does not exceed maximum allowable for gypsum board used.
2. Correct deficiencies before proceeding.

B. Application:

1. Meet requirements of ASTM C840 and GA-216.
2. Use gypsum board of maximum lengths to minimize end joints. Stagger end joints when they occur.
3. Use edge trim wherever gypsum board abuts another material.
4. Apply gypsum board to ceiling before walls.

5. Fasten gypsum board securely to framing using double nailing, screw, or adhesive method.
6. On intermediate and end supports, space fasteners 6 to 8 inches apart on walls and 5 to 7 inches apart on ceilings.
7. Keep fasteners 3/8 inch from ends and edges of panels.
8. Drive fasteners to just below surface of gypsum board without breaking the surface paper.
9. Begin fastening in center of panel and work toward edges.

3.02 FINISHING

- A. General: Meet requirements of ASTM C840; leave a flat, uniformly smooth surface ready for painting.
- B. Taping and Finishing:
 1. Apply tape properly for bond to gypsum board. When compound is dry, apply second and finishing coats in sufficient widths to form a smooth, even plane. After dry, lightly sand final coat. Do not raise nap of the paper when sanding.
 2. Finish: Conform to GA-214, Level 3.
 3. Leave gypsum board ready for painting or wall covering.
- C. Fasteners: Cover fasteners, heads, and dents and gouges with three successive coats of finishing compound, each applied in a different direction.
- D. Corner and Edge Trim: Finish with successive coats of finishing compound so as to make the bead flush with the board surface.

3.03 SPRAY TEXTURE

- A. Application:
 1. On gypsum board wall and ceiling surfaces, following manufacturers printed directions for a medium texture.
 2. Before texture application, finish gypsum board as specified for Level 3.
 3. When surfaces are prepared and dry, apply sealer and allow to dry. Mix texture finish material as directed by manufacturer.
 4. Use spray equipment of a size and type to assure acceptable results.

5. Apply by spray only at a coverage rate not to exceed 8 square feet per pound and in accordance with directions printed on container. Apply material to blend uniformly and cover fully without starved spots or other evidence of thin application. Provide uniform texture without application patterns.
6. After spray application, knock down and flatten high spots with trowel.

END OF SECTION

SECTION 09 65 01
RESILIENT TILE FLOORING AND BASE

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. F1066, Standard Specification for Vinyl Composition Floor Tile.
 - b. F1861, Standard Specification for Resilient Wall Base.

1.02 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Two full-size tiles for each type of color or pattern of resilient flooring.
 - b. Two 2-1/2-inch wide strips of base material.
 - c. Two 6-inch long strips of trim materials.
- B. Informational Submittals:
 - 1. Manufacturer's Certificate of Compliance.
 - 2. Operation and Maintenance Data:
 - a. As specified in Section 01 78 23, Operation and Maintenance Data.
 - b. List of recommended maintenance products, methods, and procedures.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Unless otherwise directed by Engineer, store materials in original containers at not less than 70 degrees F for not less than 24 hours immediately before installation.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature in space to receive flooring between 70 and 90 degrees F for not less than 24 hours before and 48 hours after installation.
- B. Maintain minimum temperature of 55 degrees F after flooring is installed, except as specified above.

1.05 SEQUENCING AND SCHEDULING

- A. Do not install floor coverings until concrete slab has cured for 60 days or until primer material in test patches cannot be scraped or peeled from the slab after drying 24 hours.

1.06 EXTRA MATERIALS

- A. Furnish additional floor covering materials from same production run as installed material at the rate of 45 square feet for each 1,000 square feet.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flooring products of the following manufacturers meeting these Specifications may be used on this Project:

1. Amtico Flooring Division, American Biltrite, Inc.
2. Armstrong World Industries, Inc.
3. Azrock Floor Products.
4. Burke Flooring Products.
5. Congoleum Corp.
6. Johnsonite, Division of Duramax, Inc.
7. Kentile Floors, Inc.
8. Mannington Commercial.
9. Mercer Plastics Co., Inc.
10. National Floor Products Co.
11. R. C. Musson Rubber Co.
12. Vinyl Plastics, Inc.

2.02 FLOOR COVERING MATERIALS

- A. Vinyl Composition Tile (VCT):

1. ASTM F1066, Class 2, through pattern tiles.
2. Size: 12 inches by 12 inches by 1/8 inch thick.
3. Manufacturers and Products:
 - a. Armstrong; Premium Excelon Stonetex.
 - b. Azrock; Thru-Quartz.

- B. Vinyl Tile (VINT):

1. ASTM F1700, Class 1, Type A, solid color tile.
2. Size: 12 by 12 inches by 1/8 inch thick.

- C. Rubber Base: ASTM F1861, Type TP, Group 2, 0.125 inch thick, coved style, 4 inches high.
- D. Adhesive: Type and brands of adhesive as recommended by manufacturer of covering material for conditions of installation.
- E. Primer and Crack Filler: Type and brand recommended by floor covering manufacturer.
- F. Wax: Furnish wax, cleaner, or other finishing material as recommended by floor covering manufacturer for the particular type of flooring material.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate for excessive moisture content and unevenness preventing execution and quality of resilient flooring as specified.
- B. Correct defects before installation of resilient flooring.

3.02 PREPARATION

- A. Remove dirt, oil, grease, or other foreign matter from surfaces to receive floor covering materials.
- B. Fill cracks less than 1/16 inch wide and depression less than 1/8 inch deep with floor filler.
- C. Prime surfaces other than wood if recommended by floor covering manufacturer.

3.03 INSTALLATION OF TILE MATERIALS

- A. Mix and apply adhesives in accordance with manufacturer's instructions.
- B. Lay tile to center of room or space. Work toward perimeter.
- C. Do not lay tile less than half the width of a field tile except where accepted by Engineer for irregularly shaped rooms or spaces. Cut border tile neatly and accurately to fit within 1/64 inch of abutting surfaces.
- D. Fit flooring material neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.

- E. Lay tile parallel to room axis in straight courses with cross joints parallel. Lay tile with grain or pattern running in opposite direction between adjacent tile.

3.04 INSTALLATION OF BASE

- A. Remove defects in wall and floor that would prevent level and true installation of base material.
- B. Install base around perimeter of room or space, where shown, and at toe spaces of casework and cabinets.
- C. Unroll base material and cut into accurate lengths as desired or as required for minimum number of joints.
- D. Match edges of seams or double cut adjoining lengths to give continuous appearance.
- E. Install with tight butt joints with no joint widths greater than 1/64 inch.
- F. Apply adhesive and firmly adhere to wall surfaces.
- G. Press down so bottom cove edge follows floor profile.
- H. Ensure top and bottom edges of base are in firm contact with walls and floors.
- I. Form internal and external corners by using premolded corners. Other methods, acceptable to Engineer, may be used if premolded corners are not available.
- J. Scribe base accurately to abutting materials.

3.05 INSTALLATION OF TRIM MATERIALS

- A. Provide where flooring covering terminates exposing edge of covering.
- B. Center reducer under door, where floor covering terminates at a door opening. Fit end edges to door frames and abutting surfaces and other edges to adjoining materials.
- C. Apply adhesives and bond securely to substrates in straight true lines. Meet visible and related features of building construction with a maximum deviation of 1/8-inch in 10 feet.

3.06 CLEANING AND PROTECTION

- A. Upon completion of the installation of floor covering and adjacent work, and after materials have set, clean surfaces with a neutral cleaner as recommended by manufacturer for type of floor covering material installed.
- B. Repair adjacent surfaces damaged by flooring installation.
- C. Protect completed work from traffic and damage until Substantial Completion by covering with plastic sheet, kraft paper, or plywood panels.

3.07 INSTALLATION SCHEDULE

- A. Areas to receive resilient flooring, and pattern, are indicated in Interior Finish Schedule.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. Environmental Protection Agency (EPA).
2. Occupational Safety and Health Act (OSHA).
3. The Society for Protective Coatings (SSPC):
 - a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
 - b. PA 3, Guide to Safety in Paint Applications.
 - c. SP 1, Solvent Cleaning.
 - d. SP 2, Hand Tool Cleaning.
 - e. SP 3, Power Tool Cleaning.
 - f. SP 5, White Metal Blast Cleaning.
 - g. SP 6, Commercial Blast Cleaning.
 - h. SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
 - i. SP 10, Near-White Blast Cleaning.
 - j. SP 11, Power Tool Cleaning to Bare Metal.
 - k. SP 12, Surface Preparation and Cleaning of Metals Waterjetting Prior to Recoating.
 - l. SP 13, Surface Preparation of Concrete.
 - m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

1.02 DEFINITIONS

A. Terms used in this Section:

1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. MDFT: Minimum Dry Film Thickness, mils.
4. MDFTPC: Minimum Dry Film Thickness per Coat, mils.
5. Mil: Thousandth of an inch.
6. PPDS: Paint Product Data Sheet.
7. PSDS: Paint System Data Sheet.
8. PVC: Polyvinyl Chloride.
9. SFPG: Square Feet per Gallon.

10. SFGPC: Square Feet per Gallon per Coat.
11. SP: Surface Preparation.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Data Sheets:
 - 1) For each product, furnish a Paint Product Data Sheet (PPDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PPDS form is appended to the end of this Section.
 - 2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this Section.
 - 3) Technical and performance information that demonstrates compliance with Specification.
 - 4) Furnish copies of paint system submittals to the coating applicator.
 - 5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
 - b. Detailed chemical and gradation analysis for each proposed abrasive material.
2. Samples:
 - a. Proposed Abrasive Materials: Minimum 2-pound sample for each type.
 - b. Reference Panel:
 - 1) Surface Preparation:
 - a) Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel for each grade of sandblast specified herein, prepared to specified requirements.
 - b) Provide panel representative of the steel used; prevent deterioration of surface quality.
 - c) Panel to be reference source for inspection upon approval by Engineer.
 - 2) Paint:
 - a) Unless otherwise specified, before painting work is started, prepare minimum 8-inch by 10-inch sample with type of paint and application specified on similar substrate to which paint is to be applied.
 - b) Furnish additional samples as required until colors, finishes, and textures are approved.
 - c) Approved samples to be the quality standard for final finishes.

B. Informational Submittals:

1. Applicator's Qualification: List of references substantiating experience.
2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services.
3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
4. Manufacturer's written verification that submitted material is suitable for the intended use.
5. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
6. Manufacturer's written instructions and special details for applying each type of paint.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
2. Perform surface preparation and painting in accordance with recommendations of the following:
 - a. Paint manufacturer's instructions.
 - b. SSPC PA 3, Guide to Safety in Paint Applications.
 - c. Federal, state, and local agencies having jurisdiction.

B. Mockup:

1. Before proceeding with Work under this Section, finish one complete space or item of each color scheme required showing selected colors, finish texture, materials, quality of work, and special details.
2. After Engineer approval, sample spaces or items shall serve as a standard for similar work throughout the Project.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Shipping:

1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.

B. Storage:

1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.
- B. Minimum of 5 years' verifiable experience in manufacture of specified product.
- C. Each of the following manufacturers is capable of supplying most of the products specified herein:
 1. Ameron.
 2. PPG.
 3. Sherwin-Williams.
 4. Tnemec.

2.02 ABRASIVE MATERIALS

- A. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

2.03 PAINT MATERIALS

A. General:

1. Manufacturer's highest quality products suitable for intended service.
2. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

B. Products:

Product	Definition
Acrylic Latex	Single-component, finish as required
Acrylic Latex (Flat)	Flat latex
Acrylic Sealer	Clear acrylic
Alkyd (Semigloss)	Semigloss alkyd
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil
DTM Acrylic Primer	Surface tolerant, direct-to-metal waterborne acrylic primer
DTM Acrylic Finish	Surface tolerant, direct-to-metal waterborne acrylic finish coat
Elastomeric Polyurethane	100% solids, plural component, spray-applied, high-build, elastomeric polyurethane coating, suitable for the intended service
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry. Approved for potable water contact and conforming to NSF 61, where required
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies aggregated; aggregate may be packaged separately
Epoxy Primer—Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
Epoxy Primer—Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
Inorganic Zinc Primer	Solvent or water based, having 85% metallic zinc content in the dry film; follow manufacturer's recommendation for topcoating

Product	Definition
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Rust-Inhibitive Primer	Single-package steel primers with anticorrosive pigment loading
Sanding Sealer	Co-polymer oil, clear, dull luster
Silicone/Silicone Acrylic	Elevated temperature silicone or silicone/acrylic based
Stain, Concrete	Acrylic, water repellant, penetrating stain
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required

2.04 MIXING

A. Multiple-Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple-component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

- B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.05 SHOP FINISHES

- A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.

- B. Surface Preparation: Provide Engineer minimum 7 days' advance notice to start of shop surface preparation work and coating application work.
- C. Shop Coating Requirements:
 - 1. When required by equipment Specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.
 - 2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.
- D. Pipe:
 - 1. Ductile Iron Pipe:
 - a. Use SSPC standards as a guide for desired prepared surface. Follow recommendations of pipe and coating manufacturers for means and methods to achieve SSPC-equivalent surface.
 - b. The surface preparation and application of the primer and finish coats shall be performed by pipe manufacturer.
 - c. For high performance (epoxy) coatings, follow additional recommendations of pipe and coating manufacturers.
 - d. Prior to blast cleaning, grind smooth surface imperfections, including, but not limited to delaminating metal or oxide layers.
 - e. For conventional (alkyd) coatings, clean asphalt varnish supplied on pipe and apply one full coat of a tar stop before two full coats of the color coats specified.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.
- B. Perform the Work only in presence of Engineer, unless Engineer grants prior approval to perform the Work in Engineer's absence.

3.02 EXAMINATION

A. Factory Finished Items:

1. Schedule inspection with Engineer before repairing damaged factory-finished items delivered to Site.
2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering.
- E. Protect surfaces adjacent to or downwind of Work area from overspray.

3.04 SURFACE PREPARATION

A. Field Abrasive Blasting:

1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.
2. Refer to coating systems for degree of abrasive blasting required.
3. Where the specified degree of surface preparation differs from manufacturer's recommendations, the more stringent shall apply.

B. Metal Surface Preparation:

1. Where indicated, meet requirements of SSPC Specifications summarized below:
 - a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
 - b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.
 - c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.
 - d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.
 - e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
 - g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
 - i. SP 12, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating: Surface preparation using high-pressure and ultrahigh-pressure water jetting to achieve specified surface cleanliness condition. Surface cleanliness conditions are defined in SSPC SP 12 and are designated WJ-1 through WJ-4 for

visual surface preparation definitions and SC-1 through SC-3 for nonvisual surface preparation definitions.

2. The words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, and “blast cleaning”, or similar words of equal intent in these Specifications or in paint manufacturer’s specification refer to the applicable SSPC Specification.
3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers’ recommendations for wet blast additives and first coat application shall apply.
4. Ductile Iron Pipe Supplied with Asphaltic Varnish Finish: Remove asphaltic varnish finish prior to performing specified surface preparation.
5. Hand tool clean areas that cannot be cleaned by power tool cleaning.
6. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
7. Welds and Adjacent Areas:
 - a. Prepare such that there is:
 - 1) No undercutting or reverse ridges on weld bead.
 - 2) No weld spatter on or adjacent to weld or any area to be painted.
 - 3) No sharp peaks or ridges along weld bead.
 - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
8. Preblast Cleaning Requirements:
 - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
 - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
 - c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.
9. Blast Cleaning Requirements:
 - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer’s recommendations.
 - b. Select type and size of abrasive to produce surface profile that meets coating manufacturer’s recommendations for particular primer to be used.
 - c. Use only dry blast cleaning methods.
 - d. Do not reuse abrasive, except for designed recyclable systems.

- e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
- 10. Post-Blast Cleaning and Other Cleaning Requirements:
 - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
 - b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.
- C. Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation:
 - 1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.
 - 2. Remove oil and grease by wiping or scrubbing surface with suitable solvent, rag, and brush. Use clean solvent and clean rag for final wiping to avoid contaminating surface.
 - 3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.
- D. Concrete Surface Preparation:
 - 1. Do not begin until 30 days after concrete has been placed.
 - 2. Meet requirements of SSPC SP 13.
 - 3. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
 - 4. Brush-off blast clean to remove loose concrete and laitance, and provide a tooth for binding. Upon approval by Engineer, surface may be cleaned by acid etching method. Approval is subject to producing desired profile equivalent to No. 80 grit flint sandpaper. Acid etching of vertical or overhead surfaces shall not be allowed.
 - 5. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after blasting.
 - 6. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.
- E. Plastic and FRP Surface Preparation:
 - 1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.

2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

F. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.
2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.
3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
 - a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
 - b. Brush-off blasting.
 - c. Water blasting.
4. Do not damage masonry mortar joints or adjacent surfaces.
5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.
6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.
7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

G. Wood Surface Preparation:

1. Replace damaged wood surfaces or repair in a manner acceptable to Engineer prior to start of surface preparation.
2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.
3. Round sharp edges by light sanding prior to priming.
4. Filler:
 - a. Synthetic-based wood putty approved by paint manufacturer for paint system.
 - b. For natural finishes, color of wood putty shall match color of finished wood.
 - c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.
 - d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer's recommendations.
 - e. Use cellulose type putty for stained wood surfaces.
5. Ensure surfaces are clean and dry prior to painting.

- H. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.
 - 1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.
- I. Existing Painted Surfaces to be Repainted Surface Preparation:
 - 1. Detergent wash and freshwater rinse.
 - 2. Clean loose, abraded, or damaged coatings to substrate by hand or power tool, SP 2 or SP 3.
 - 3. Feather surrounding intact coating.
 - 4. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.
 - 5. Apply one full finish coat of specified primer to entire surface.
 - 6. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.
 - 7. For ductile iron pipe with asphaltic varnish finish not specified to be abrasive blasted, apply coat of tar stop prior to application of cosmetic finish coat.
 - 8. Application of Cosmetic Coat:
 - a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.
 - b. Check compatibility by application to a small area prior to starting painting.
 - c. If lifting or other problems occur, request disposition from Engineer.
 - 9. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

3.05 SURFACE CLEANING

- A. Brush-off Blast Cleaning:
 - 1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
 - 2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.
 - 3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
 - 4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
 - 5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
 - 6. Repair or replace surface damaged by blast cleaning.

B. Acid Etching:

1. After precleaning, spread the following solution by brush or plastic sprinkling can: One part commercial muriatic acid reduced by two parts water by volume. Adding acid to water in these proportions gives an approximate 10 percent solution of HCl.
2. Application:
 - a. Rate: Approximately 2 gallons per 100 square feet.
 - b. Work acid solution into surface by hard-bristled brushes or brooms until complete wetting and coverage is obtained.
 - c. Acid will react vigorously for a few minutes, during which time brushing shall be continued.
 - d. After bubbling subsides (10 minutes), hose down remaining slurry with high pressure clean water.
 - e. Rinse immediately to avoid formation on the surface of salts that are difficult to remove.
 - f. Thoroughly rinse to remove any residual acid surface condition that may impair adhesion.
3. Ensure surface is completely dry before application of coating.
4. Apply acid etching to obtain a "grit sandpaper" surface profile. If not, repeat treatment.

C. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

A. General:

1. The intention of these Specifications is for new, interior and exterior wood, concrete, and metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise.
2. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
3. Sand wood lightly between coats to achieve required finish.
4. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
5. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.

6. On pipelines, terminate coatings along pipe runs to 1-inch inside pipe penetrations.
 7. Keep paint materials sealed when not in use.
- B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:
1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.
 2. Prepare surface and apply primer in accordance with System No. 10 specification.
 3. Apply intermediate and finish coats of the coating system appropriate for the exposure.
- C. Porous Surfaces, Such As Concrete and Masonry:
1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects.
 2. Prime Coat: May be thinned to provide maximum penetration and adhesion.
 - a. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.
 3. Surface Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.
- D. Film Thickness and Coverage:
1. Number of Coats:
 - a. Minimum required without regard to coating thickness.
 - b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
 2. Application Thickness:
 - a. Do not exceed coating manufacturer's recommendations.
 - b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
 3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
 - a. Perform with properly calibrated instruments.
 - b. Recoat and repair as necessary for compliance with Specification.
 - c. Coats are subject to inspection by Engineer and coating manufacturer's representative.
 4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.

5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.
- B. System No. 5 Exposed Metal—Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer—Ferrous Metal	1 coat, 2.5 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
 - a. Exposed metal surfaces, located inside or outside of structures and exposed to weather or in a highly humid atmosphere, including the following specific surfaces:
 - 1) Truck scales.

- C. System No. 10 Galvanized Metal, Copper, and Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Epoxy Primer—Other	As recommended by coating manufacturer Remaining coats as required for exposure

1. Use on the following items or areas:
 - a. Galvanized/nonferrous surfaces requiring painting.
 - b. After application of System No. 10, apply finish coats as required for exposure.

D. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete.

E. System No. 101 Wood, Stained (Interior or Exterior):

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Wood Surface Preparation	Wood Stain Solid	2 coats, 250 SFPGPC

1. Use on exposed wood in contact with concrete.

F. System No. 102 Wood, Semigloss (Interior or Exterior):

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Wood Surface Preparation	Alkyd Wood Primer	1 coat, 400 SFPG
	Alkyd (Semigloss)	1 coat, 400 SFPG

G. System No. 106 Galvanized Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Manufacturer's Recommended Primer	1 coat, as recommended by manufacturer
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

1. Use on hollow metal frames and doors.

H. System No. 107 Metal Trim and Structural Steel:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust-Inhibitive Primer	1 coat, 2 MDFT
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

1. Use on structural steel for repair.

I. System No. 110 Concrete Sealer:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Siloxane Sealer	2 coats, 100 SFPGPC

1. Use on exposed concrete walls.

J. System No. 111 Concrete and Masonry, Stain and Seal:

Surface Prep.	Paint Material	Min. Coats, Cover
Concrete: In accordance with Paragraph Concrete Surface Preparation -OR- Masonry: In accordance with Paragraph Masonry Surface Preparation	Stain, Concrete	2 coats, 250 SFPGPC
	Acrylic Sealer	2 coats, 100 SFPGPC

1. Use on the following items or areas:
 - a. Electrical Room and Access Space, Tipping Floor and Lower Level Floor.

K. System No. 113 Concrete, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

1. Use on the following items or areas:
 - a. Where scheduled.

L. System No. 116 Gypsum Board and Plaster, Gloss Epoxy:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Gypsum Board Surface Preparation	Manufacturer's Recommended Primer	1 coat, 350 SFPG
	Water Base Epoxy (Gloss)	1 coat, 250 SFPG

1. Use on the following items or areas:
 - a. Restroom.

M. System No. 121 Concrete, Skid-Resistant:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Epoxy Nonskid (Aggregated)	1 coat, 160 SFPG

1. Use on the following items or areas:
 - a. Where scheduled.

N. System No. 127 Traffic Striping:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Acetone Based Acrylic Nonskid (Aggregated)	1 coat, 160 SFPG

1. Use on the following items or areas:
 - a. Tipping Floor and Lower Level.

3.08 COLORS

- A. Provide as shown in Schedule for Finishes on Drawings.
- B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.
- C. Equipment Colors:
 - 1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
 - 2. Paint equipment and piping one color as selected.
 - 3. Paint nonsubmerged portions of equipment the same color as the piping it serves, except as itemized below:
 - a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
 - b. Fire Protection Equipment and Apparatus: OSHA Red.
 - c. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.
- D. Pipe Identification Painting:
 - 1. Color code nonsubmerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.
 - 2. Pipe Color Coding: As directed by the Engineer.
 - 3. Pipe Supports: Painted light gray, as approved by the Engineer.
- E. Pipe System Color Code:

Pipe System	Color
Compressed Air	Federal Safety Purple
Drains	Black
Fuel Oil Supply	Federal Safety Orange
Fuel Oil Return	Federal Safety Orange
Potable Water	Light Blue

3.09 FIELD QUALITY CONTROL

A. Testing Equipment:

1. Provide magnetic type dry film thickness gauge to test coating thickness specified in mils, as manufactured by Nordson Corp., Anaheim, CA, Mikrotest.
2. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.
3. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

B. Testing:

1. Thickness and Continuity Testing:
 - a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
 - b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE RP0188.
 - c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE RP0188.
 - d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

D. Unsatisfactory Application:

1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
3. Repair defects in accordance with written recommendations of coating manufacturer.

E. Damaged Coatings, Pinholes, and Holidays:

1. Feather edges and repair in accordance with recommendations of paint manufacturer.
2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
3. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

3.10 MANUFACTURER'S SERVICES

- A. In accordance with Section 01 43 33, Manufacturers' Field Services, coating manufacturer's representative shall be present at Site as follows:
1. On first day of application of any coating system.
 2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
 3. As required to resolve field problems attributable to or associated with manufacturer's product.
 4. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.11 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.
- C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.12 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are a part of this Specification:
1. Paint System Data Sheet (PSDS).
 2. Paint Product Data Sheet (PPDS).

END OF SECTION

PAINT SYSTEM DATA SHEET (PSDS)

Complete this PSDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single PSDS.

Paint System Number (from Spec.):		
Paint System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

PAINT PRODUCT DATA SHEET (PPDS)

Complete and attach manufacturer's Technical Data Sheet to this PPDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

Temperature/RH	50/50	70/30	90/25
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer's recommendations for the following:

Mixing Ratio: _____

Maximum Permissible Thinning: _____

Ambient Temperature Limitations: min.: _____ max.: _____

Surface Temperature Limitations: min.: _____ max.: _____

Surface Profile Requirements: min.: _____ max.: _____

Attach additional sheets detailing manufacturer's recommended storage requirements and holiday testing procedures.

SECTION 10 28 00
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 DESIGN REQUIREMENTS

- A. Design grab bars and attachments to resist minimum 250-pound (0.22-kN) concentrated load applied at any point in any direction.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Manufacturer's literature clearly indicating:
 - a. Size and description of components.
 - b. Base material with surface finish inside and out.
 - c. Hardware and locks and attachment devices.
 - d. Description of rough-in framing.
 - e. Details of blocking and anchorage required.

B. Informational Submittals:

1. Distributor's List: List of local distributors for supplies required for accessories installed.
2. Cleaning instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Materials and products specified in this Section shall be products of:

1. Bobrick Washroom Equipment, Inc.
2. Bradley Corp.
3. Accessory Specialties, Inc.
4. Watrous, Inc.

2.02 TOILET AND BATH ACCESSORIES

A. Furnish accessory items listed where indicated by mark or note on Drawings.

Item	Mark	Bobrick	Bradley
Surf. Mounted Duel Roll Toilet Paper Dispenser	TPD	No. B-2740	No. 5241-50

Item	Mark	Bobrick	Bradley
Wall Mounted Liquid Soap Dispenser	SD-2	No. B-4112	No. 6542
Mirror, Size on Dwgs	MIR	No. B-290	No. 780
Surf. Mounted Paper Towel Dispenser	PTD-2	No. B-262	No. 250-15
Surf. Mounted Waste Receptacle	WR-1	No. B-275	No. 355
Surf. Mounted Seat Cover dispenser	SCD-2	No. B-221	No. 5831
Mop and Broom Holder (24")	M&BH	No. B-223 x 24	No. 9953
Robe Hook	RH	No. B-6727	No. 9124
Grab Bars (straight) (36")	GB-1	No. B-6806-36	No. 812-001-36
Grab Bars (straight) (42")	GB-2	No. B-6806-42	No. 812-001-42

- B. Finish:
1. Satin stainless steel.
 2. Manufacturer's or brand name on face of units is not acceptable.
- C. Anchors: Furnish anchors, fasteners, or other devices necessary for a complete, secure installation.
1. Fasteners: Tamper-proof screws or bolts.
- D. Supplies: Furnish fill supplies, such as paper goods, soap, and napkins, as recommended by accessory manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate support framing and backing as necessary for proper installation of accessories.
- B. Coordinate the Work with placement of internal wall reinforcement to receive anchor attachments.

3.02 INSTALLATION

- A. Mounting Heights and Locations: Locate where mark is shown on Drawings at height required by accessibility regulations and as indicated.
- B. Follow manufacturer's instruction and recommendations.

- C. Install and securely anchor accessories in their proper locations, plumb and level, and without distortion.
- D. Remove protective masking and clean surfaces, leaving them free of soil and imperfections.
- E. Fill units with necessary supplies within 10 days before Substantial Completion.
- F. Deliver to Owner keys and devices required to fill and service units.

3.03 CLEANING

- A. Clean and repair existing toilet accessories which remain or are to be reinstalled.

3.04 SCHEDULE

- A. Fixtures as shown on Interior Elevations.

END OF SECTION

SECTION 10 44 00
PORTABLE FIRE AND SAFETY EQUIPMENT

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. Factory Mutual (FM).
 2. Mine Safety and Health Administration (MSHA).
 3. National Fire Protection Association (NFPA):
 - a. 10, Standard for Portable Fire Extinguishers.
 - b. 30, Flammable and Combustible Liquids Code.
 4. National Institute of Safety and Health (NIOSH): Certification Program.
 5. Occupational Safety and Health Act (OSHA).
 6. Underwriters Laboratories Inc. (UL): Fire Protection Equipment List.

1.02 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Provide fire rated fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

1.03 SUBMITTALS

- A. Action Submittals:
1. Fire Extinguishers: Submit manufacturer's product data for each item, including sizes, ratings, UL listings, or other certifications, and mounting information.
 2. Extinguisher Cabinets: Indicate type of cabinet, cabinet physical dimensions, wall bracket mounted measurements, location, fire ratings, mounting methods and anchorage details, relationship of cabinet box and trim to surrounding construction, door type and hardware, trim style.
 3. Product Data: Submit extinguisher operational features, color and finish, anchorage details.

B. Informational Submittals:

1. Operation and Maintenance Data: Submit test, refill or recharge schedules and recertification requirements.

PART 2 PRODUCTS

2.01 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

1. JL Industries.
2. Larsen's Manufacturing Co.
3. Nystrom Products Co.
4. Potter Roemer.
5. Kidde.

B. General:

1. Conform to NFPA 10 for fire extinguishers.
2. Furnish fire extinguishers and cabinets from one manufacturer.
3. UL listed, charged and ready for service.

C. Multipurpose Hand Extinguisher (F. Ext-1):

1. Tri-class dry chemical extinguishing agent.
2. Pressurized, red enameled steel shell cylinder.
3. Activated by top squeeze handle.
4. Agent propelled through hose or opening at top of unit.
5. For use on A, B, and C class fires.
6. Minimum UL Rating: 4A-60B:C, 10-pound capacity.

D. Carbon Dioxide Hand Extinguisher (F. Ext-2):

1. Carbon dioxide.
2. Pressurized, red enameled steel shell cylinder.
3. Activated by top squeeze handle.
4. Agent propelled through hose and spreader nozzle.
5. For use on B and C class fires.
6. Minimum UL Rating: 10B:C, 15-pound capacity.

E. Dry Chemical Wheeled Extinguisher (F. Ext-3):

1. Tri-class dry chemical extinguishing agent.
2. Pressurized red enameled steel shell cylinder on a rubber-wheeled handtruck type carriage.

3. Agent propelled through 50 feet of hose and spreader nozzle that can produce either a fan stream with a range of 10 feet to 15 feet or a straight stream with a range of 35 feet to 40 feet.
4. For use on A, B, and C class fires.
5. Minimum UL Rating: 120B:C, 150-pound minimum capacity.

2.02 FIRE EXTINGUISHER CABINETS

A. Manufacturers:

1. JL Industries.
2. Larsen's Manufacturing Co.
3. Modern Metal Products.

B. Extinguisher Cabinet Type:

1. Surface mounted.
2. Sized to accommodate accessories.

C. Metal: Formed sheet steel, minimum 0.036 inch thick.

D. Configuration: Surface type, sized to accommodate accessories.

E. Door: Minimum 0.016-inch thick, full metal, reinforced for flatness and rigidity; latch access.

F. Cabinet Mounting Hardware: Appropriate to cabinet and wall type.

G. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim.

H. Predrill for anchors.

I. Hinge doors for 180-degree opening with continuous piano hinge. Furnish nylon or roller type catch.

J. Weld, fill, and grind components smooth.

K. Finishing Cabinet Exterior Trim and Door: White baked enamel or powder coat. Label: "FIRE EXTINGUISHER" red or black decal.

L. Finishing Cabinet Interior: Enamel or powder coat.

2.03 FIRST-AID CABINETS AND SUPPLIES

A. Manufacturers:

1. Afassco, Inc.

2. Johnson & Johnson.
3. Zee Medical Products Co., Inc.

B. Cases:

1. Enameled metal or break-resistant plastic.
2. Carrying handles.
3. Made to hang on wall.

C. Supplies: Quantities to serve 10 people.

2.04 ACCESSORIES

- A. Extinguisher Brackets: For hand extinguishers not located in cabinets, furnish heavy-duty brackets with clip-together strap for wall mounting, formed steel, galvanized.
- B. Provide graphic identification marking for each fire extinguisher type. OSHA approved pictorial markings to indicate the extinguisher uses and nonuses on a single label.
- C. Fasteners: Furnish necessary screws, bolts, brackets, and other fastenings of suitable type and size to secure items of fire and safety equipment in position.
 1. Metal expansion shields for machine screws at concrete and masonry.
 2. Interior: Rust-resistant.
 3. Exterior: Stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify cabinets are correctly sized for fire extinguisher type.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install where indicated or directed and following manufacturer's recommendations.
- B. Install cabinets plumb and level in wall openings, maximum 48 inches from finished floor to top of extinguisher handle.
- C. Secure cabinets and brackets rigidly to structure.
- D. Provide adequate backing for mounting surfaces.

- E. Place extinguishers accessories in cabinets or on wall brackets.
- F. Position cabinet signage as required by authorities having jurisdiction.

3.03 PORTABLE FIRE EXTINGUISHERS AND CABINETS

- A. Provide at locations shown or as directed by Engineer.
- B. Mount hangers securely in position, following manufacturer's recommendations.
- C. Top of Extinguisher: No more than 48 inches above floor.
- D. Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle.

END OF SECTION

SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Architectural Manufacturers' Association (AAMA):
 - a. 101, Standard Specifications for Windows, Doors, and Unit Skylights.
 - b. 605, Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - c. 606.1, Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
2. American Institute of Steel Construction (AISC):
 - a. 360, Specification for Structural Steel Buildings.
 - b. RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
 - c. Design Guide 3: Serviceability Design Considerations for Steel Buildings.
3. American Iron and Steel Institute (AISI): Specification for the Design of Cold-Formed Steel Structural Members.
4. American Welding Society (AWS): D1.1/D1.1M, Structural Welding Code - Steel.
5. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - c. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - d. A490/A490M, Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength.
 - e. A529/A529M, Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
 - f. A572/A572M, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - g. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - h. A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - i. A992/A992M, Standard Specification for Steel for Structural Shapes.

- j. C991, Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.
- k. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- l. E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.
- m. E2190, Standard Specification for Insulating Glass Unit Performance and Evaluation.
- n. E1514, Standard Specification for Structural Standing Seam Steel Roof Panel Systems.
- o. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- 6. International Accreditation Service, Inc. (IAS): Quality Certification Program.
- 7. International Code Council (ICC): International Building Code (IBC).
- 8. Metal Building Manufacturer's Association (MBMA): Metal Building Systems Manual.
- 9. Steel Door Institute (SDI): A250.8, Standard Steel Doors and Frames.
- 10. Underwriters Laboratories Inc. (UL): 580, Tests for Uplift Resistance of Roof Assemblies.

1.02 SYSTEM DESCRIPTION

- A. Complete building package using manufacturer's standard components.
- B. Primary Framing System: Clear span rigid frame. Rigid frame at end walls.
- C. Lateral Support System in Longitudinal Direction: Cross bracing and portal frames, located as shown on Drawings. At the Z-wall canopies, the structural system is reversed.
- D. Include: Doors, insulation, liner panels, and roof accessories.

1.03 DESIGN REQUIREMENTS

- A. Applicable Building Code: The 2009 International Building Code (IBC), as amended by the State of Washington and local agencies.
- B. Refer to design criteria on Drawing General Structural Notes.
- C. Deflection Criteria:
 - 1. In accordance with the applicable provisions of the AISC Design Guide 3. Conformance is required to deflection criteria as stated in the Appendix.

2. Applies to primary and secondary framing members, bracing members, roof panels, and wall cladding.

D. Design Standards:

1. AISC 360.
2. AISC RCSC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.
3. AISI Specification for the Design of Cold-Formed Steel Structural Members.
4. AWS D1.1/D1.1M.

- E. Consider prying action of bolts for bolted moment-resistant connections in primary framing.

- F. Design column bases as pinned, unless specifically indicated otherwise.

1.04 CONTRACTOR/METAL BUILDING MANUFACTURER COORDINATION

- A. Metal building Shop Drawings are to be submitted and approved prior to forming of foundation concrete or fabrication of foundation reinforcing steel. Specific attention shall be given to providing for adequate size of concrete column pilasters for steel column baseplates and its associated anchor bolt template.

- B. Contractor shall verify interface of building components with foundation.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Manufacturer's literature and technical data.
 - b. Drawings Stamped by Building Manufacturer's Engineer:
 - 1) Drawings shall be specifically prepared for this Project.
 - 2) Mark out details that do not apply to Project.
 - 3) Show design load criteria, material specifications for framing members and connections, roof framing plan with dimensions and member sizes, baseplate details showing anchor bolt size and bolt layout, elevations of wall framing and bracing, instructions for temporary bracing, framing around roof and wall openings, details for joining and sealing of roof panels and wall cladding, and sections and details for all components and accessories.
 - c. Drawings stamped by Contractor's engineer registered in the State of Washington for complete anchor bolt design at each column

location. Design shall include, but is not limited to, concrete anchor reinforcements, anchor bolt diameter, number of anchor bolts required, anchor bolt layout, location, material, threaded projection, concrete edge distances and embedment length at each column connection. Coordinate with the metal building system manufacturer for the anchor bolt reactions, anchor bolt diameter and layout as required and maintain all critical dimensions noted on Drawings. Alternatively, the building manufacturer may provide the complete anchor bolt design; however, the Contractor shall coordinate with the building manufacturer to ensure that the building manufacturer can provide a complete anchor bolt design.

- d. Painting System: Specifications; include paint manufacturer's name, product trade name, and preparation for shop and field coats.
- 2. Samples: Minimum 2-inch by 3-inch metal for components requiring color selection.

B. Informational Submittals:

- 1. Structural Calculations Stamped by Engineer:
 - a. Complete analysis and design of structural components and connections in accordance with design requirements indicated.
 - b. Summary of building column reactions to foundation level for load cases.
 - c. Mark out calculations that do not apply to Project.
- 2. Manufacturer's written instructions for shipping, handling, storage, protection, and erection or installation of building and components.
- 3. Manufacturer: IAS Quality Certification: IAS certificate showing name and address of manufacturer, effective date, and category of certification.
- 4. Erector:
 - a. IAS Quality Certification: IAS certificate showing name and address of erector, effective date, and category of certification, or, in lieu of IAS certification, documentation of past 5 years' experience record to include project name, location, date of completion, building manufacturer, and name and phone number of Owner's contact person.
 - b. Certification of approval by manufacturer.
- 5. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Designer: Registered professional engineer valid in same state as Project.
2. Manufacturer: IAS Quality Certification: Metal Building Systems (MB).
3. Erector:
 - a. IAS Quality Certification as Certified Steel Erector (CSE), or 5 years of experience in erection of metal building systems in lieu of IAS certification.
 - b. Approval by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect building components and accessories from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Deliver to Site with parts individually tagged.
- C. Store on wood blocking or pallets, flat and off ground, to keep clean and to prevent damage or permanent distortion. Support bundles so there is no danger of tipping, sliding, rolling, shifting, or material damage. Cover with tarpaulins or other suitable weathertight ventilated covering.
- D. Protect finish of metal panels by application of removable plastic film or other suitable material placed between panels. Do not allow panels to come in contact with other material that would result in scratching, denting, staining or other damage to panel finish.

1.08 SPECIAL GUARANTEE

- A. Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of Owner, removal and replacement of Work specified in this Section found defective during a minimum period of 5 years and as stated below after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in the General Conditions.
- B. Conditions:
 1. Finish on metal roof, wall panels, flashing, and trim will not chalk, crack, check, blister, peel, flake, chip, or lose adhesion for 5 years.
 2. Roofing will remain weathertight for 20 years.

PART 2 PRODUCTS

2.01 BUILDING SYSTEM MANUFACTURERS

- A. Products manufactured or supplied by the following, and meeting these Specifications, may be used on this Project:
 - 1. Butler Manufacturing Co, Kansas City, MO.
 - 2. Star Building Systems, a Robertson Ceco Co., Oklahoma City, OK.
 - 3. Varco-Pruden Buildings, Memphis, TN.
- B. Building layout as shown on Drawings is based on products of Varco-Pruden.

2.02 COMPONENTS

- A. Structural Framing and Bracing:
 - 1. Primary Framing: ASTM A36/A36M, ASTM A529/A529M, ASTM A572/A572M, or ASTM A992 with 3/16-inch minimum thickness and factory primer compatible with finish coating.
 - 2. Secondary Framing: Steel for cold-formed galvanized channel and z-sections shall be ASTM A653/A653M, Structural Steel (SS) Grade 33 or High-Strength Low-Alloy Steel (HSLAS) Grade 50 Type A or B, with G60 galvanized coating and minimum design thickness equal to 0.0346 inch.
 - 3. Bracing:
 - a. ASTM A36/A36M or ASTM F1554, Grade 36, for threaded rod, or ASTM A36/A36M for rolled shapes.
 - b. Do not use wire rope or cable for permanent bracing.
 - 4. Bolted Connections:
 - a. Primary Framing: ASTM A325 or ASTM A490/A490M high-strength bolted connections.
 - b. Secondary Framing: ASTM A307 or ASTM A325.
- B. Roof and Wall Panels:
 - 1. Material:
 - a. ASTM A653/A653M or ASTM A792/A792M preformed ribbed steel panels, Grade 50, minimum.
 - b. Minimum 24-gauge galvanized steel with roll-formed corrugations for structural stiffness and appearance.
 - c. Finish: Factory-applied baked enamel, in color selected by Engineer.

- d. Translucent FRP Wall Panels:
 - 1) Corrugations to match wall panels.
 - 2) Manufacturers:
 - a) Resolite Corporation.
 - b) Approved equal.
- 2. Roof Panel System:
 - a. ASTM E1514 structural standing seam steel roof panel system.
 - b. Panels shall be one piece from eave to ridge, with concealed clips and fasteners to purlins to allow for thermal movement over 120-degree ambient temperature range.
 - c. Sidelap joints shall be made with a factory caulked, mechanically seamed cleat.
 - d. Tested and certified to meet UL 580, Class 90 wind uplift rating.
- 3. Wall Panel System:
 - a. One piece from eave to sill, with base trim at sill.
 - b. Sidelaps: Overlapping major ribs with exposed color-matched fasteners.
 - c. Translucent Panel: Clear translucent with C/W Barrier coating. Locations as shown on Drawings.
- 4. Wall Liner Panels:
 - a. One piece, height as shown on Drawings.
 - b. Sidelaps: Overlapping major ribs with exposed color-matched fasteners.

2.03 ACCESSORIES

- A. Hollow Metal Doors, Frames, and Hardware:
 - 1. As specified in Section 08 11 01, Steel Door Assemblies.
 - 2. Furnish hardware including hinges, cylindrical lock sets, automatic closing devices, full weatherstripping, and thresholds, as applicable.
- B. Roll-Up Doors: As specified in Section 08 30 00, Specialty Doors.
- C. Operation: Motor with pushbuttons inside.
- D. Roof Accessories: Snow guards per Section 07 70 01, Roof Specialties and Accessories.
- E. Metal Building Blanket Insulation:
 - 1. As specified in Section 07 21 00, Thermal Insulation.
 - 2. Provide at roof as indicated on Drawings.
- F. Thermal Blocks: High-density, 3/4-inch thick extruded polystyrene, for installation over structural framing members.

- G. Trim: Factory-formed and factory-painted ridge cap, rake trim, simple eave trim, panel side trim, corner trim, door trim, and other trim as necessary.
- H. Gutter Fascia and Downspouts:
 - 1. Material: ASTM A653/A653M, 26-gauge galvanized steel.
 - 2. Gutter Fascia:
 - a. Prefinish.
 - b. Furnish hangers with factory-applied paint.
 - 3. Preformed Corner Closures: Furnish to match configuration of gable fascia.
 - 4. Downspouts:
 - a. Configuration: Nominal 4-inch corrugated rectangular box with minimum 11 square inches of cross section area.
 - b. Factory finish to match wall panels.
- I. Miscellaneous: Furnish fasteners, metal-backed neoprene washers, weatherstripping, sealants, roof jacks, roof curbs, gaskets, and other items as required for a complete installation.

2.04 FABRICATION

- A. Factory Fabricate: To manufacturer's written standards, MBMA Metal Building Systems Manual, and AISC Specification for Structural Steel Buildings.
- B. Building Parts: Accurate and true to dimension to facilitate building erection without cutting, fitting, or other alterations.
- C. Welded Connections: In accordance with AWS D1.1/D1.1M.
- D. Shop Primer for Primary Framing:
 - 1. Surface Preparation and Primer: As specified in Section 09 90 00, Painting and Coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting concrete foundation and anchor bolt placement for compliance with requirements for installation tolerances and other conditions affecting performance of metal building.

3.02 BUILDING ERECTION

- A. Erect building system in accordance with manufacturer's standards and instructions.
- B. Provide temporary bracing in accordance with MBMA standards and as required for safe installation.
- C. Structural Framing:
 - 1. Do not field cut or alter primary or secondary framing members.
 - 2. Installation and tolerances shall be in accordance with MBMA Metal Building Systems Manual.
- D. Roof and Wall Panels:
 - 1. Field cutting of panels by torch is not permitted.
 - 2. Attach panels to structural supports to maintain a weathertight seal while allowing for thermal and structural movement.
 - a. Install exposed fasteners in true vertical and horizontal alignment.
 - b. Field seam side laps of standing seam roof panels using electrically operated seaming machine.
 - c. Use proper tools to install screw fasteners to compress neoprene washer without damaging washer or stripping metal.
 - 3. Install manufacturer's standard joint sealants, gaskets, and closure strips as required for weathertight installation.
 - 4. Install roof curbs for roof top equipment.
 - 5. Field Cutting and Patching: Perform in manner not to impair appearance, weathertightness, or structural capacity of panel system.

3.03 REPAIR, CLEANING, AND PAINTING

- A. Immediately following erection, remove unused material, screws, fasteners, and other debris from completed installation. Use caution in removing metal cuttings from surface of prefinished metal panels.
- B. Replace damaged, dented, buckled, or discolored metal panels.
- C. Repair damaged painted and galvanized surfaces as specified in Section 09 90 00, Painting and Coating.
- D. Finish Painting: As specified in Section 09 90 00, Painting and Coating.

3.04 FIELD QUALITY CONTROL

- A. Special inspection will be provided by Owner.

3.05 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection, and certification of proper installation.

END OF SECTION