

CONTRACT DOCUMENTS
FOR THE CONSTRUCTION OF THE

WASTEWATER TREATMENT PLANT IMPROVEMENTS



CITY OF WHITE HOUSE
TENNESSEE

VOLUME 1 OF 5
SPECIFICATIONS

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JACOBS[®]

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PROJECT No. 708498

JUNE 2019

90% DESIGN DOCUMENTS

**CITY OF WHITE HOUSE
TENNESSEE**

**BIDDING REQUIREMENTS
AND
CONTRACT DOCUMENTS**

for the construction of the

WASTEWATER TREATMENT PLANT IMPROVEMENTS

Contract No. _____

JACOBS

JUNE 2019

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Project No. 708498

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**DIVISION 00 - PROCUREMENT
AND CONTRACTING
REQUIREMENTS**

ADVERTISEMENT FOR BIDS

Sealed Bids for the project entitled Wastewater Treatment Plant Improvements will be received by the City of White House at 2:00 p.m. local time on _____, 2019, at 105 College Street, White House, Tennessee 37188 and then publicly opened and read aloud.

The completed Work will provide the Owner with a fully functional operational, expanded and upgraded 2 MGD wastewater treatment facility. The Work will consist of construction of new systems, and reuse of existing systems including civil, electrical, instrumentation and control, structural, architectural and HVAC works for a complete operating plant.

1. New Systems:
 - a. Grit Removal Facility with grit pump and classifier.
 - b. Bioreactor System, two trains with mixers, mechanical aerators, and aeration diffusers.
 - c. Two reaeration blowers with canopy.
 - d. One new clarifier with integral scum pit and pump.
 - e. Three RAS pumps and three WAS pumps.
 - f. Two effluent filters.
 - g. Alum storage tank and metering pump skid.
 - h. One UV disinfection system with Parshall flume.
 - i. Two reclaimed water distribution pumps.
2. Civil works as documented in the documents including but not limited to access road and associated drainage structure and outfall line to the creek.
3. Architectural and HVAC work including the operations building, electrical building, and miscellaneous changes to the RAS/WAS building.

Allotted time for project completion is 550 calendar days.

There will be a Pre-Bid Meeting on _____, 2019, at 10:00 a.m at the project site.

The Contract Documents may be examined at the following locations:

White House
105 College Street
White House, TN 37188

Jacobs Engineering Group Inc.
One Vantage Way, Suite B-400
Nashville, TN 37228

Ms. Shelia Simpson, Program Director
Governor's Office of Diversity
Business Enterprise
Electronic Only - GO.DBE@tn.gov

Digital plans and specs may be downloaded from QuestCDN.com for \$10.00. Quest eBidDoc no. is . Printed copies of Contract Documents may be obtained at the office of Jacobs Engineering Group Inc., upon payment of \$500.00, non-refundable, for each set. Please contact call

ADVERTISEMENT FOR BIDS

615-254-6002 to order Contract Documents. No partial sets will be sold. Shipment will be via delivery service – two-day delivery. Other shipping will be at the purchaser’s additional expense. Street address must be provided to allow delivery.

Attention is called to the fact that the Contractor must ensure that employees and applicants for employment are not discriminated against because of their race, color, religion, sex, or national origin.

The Bid deposit shall be retained by the City of White House if the successful Bidder fails to execute the Contract or fails to provide the required Bonds, as stated above, within ten (10) days after award of the Contract.

DAVIS-BACON ACT and AMERICAN IRON AND STEEL REQUIREMENTS

This project is being funded by a State Revolving Fund loan on or after 2015 EPA Fiscal Year. The loan recipient must be in compliance with all applicable Davis-Bacon Act and American Iron and Steel requirements.

Disadvantaged Business Enterprises (DBE) Requirements:

Any contract or contracts awarded by the Owner through this Invitation for Bids will be funded by a State Revolving Fund (SRF) Loan from the State of Tennessee. State and Federal funds will be involved in this Project and, as a result, Bidders must comply with the SRF Loan Program’s Disadvantaged Business Enterprises (DBE) requirements, including contacting a minimum of ten qualified DBE potential sub-contractors, professional service providers, vendors, and/or suppliers by certified mail to solicit Bids. The apparent successful Bidder must submit to the Owner copies of the certified letters and return receipts prior to contract award. Neither the State of Tennessee nor any of its departments, agencies, or employees is or will be a party to this Invitation for Bids or any resulting contract(s) awarded by the Owner.

Special Notice to Disadvantaged Business Enterprises (DBE) Firms:

All qualified Disadvantaged Business Enterprises (DBE) firms desiring to bid as a General Contractor, sub-contractor, professional service provider, supplier, or equipment vendor are encouraged to contact Ms. Shelia Simpson, Program Director at the Governor’s Office Diversity Business Enterprise to review bidding/contract documents. Qualified DBE firms may also contact Jacobs Engineering Group Inc., One Vantage Way, Suite B-400, Nashville, TN 37228 in order to obtain copies of bidding/contract documents.

Compliance with Davis- Bacon wage rate provisions is a requirement of this Project.

The Owner will in no way be liable for any costs incurred by any bidder in the preparation of its Bid in response to this Invitation to Bid.

No bid may be withdrawn within 60 calendar days after the scheduled time for receipts of bids.

ADVERTISEMENT FOR BIDS

The successful Bidder shall be required to furnish separate one hundred percent (100%) Performance and Payment Bonds. The Performance Bond shall be in full force and effect for one (1) year after the date of final acceptance of the project by the City of White House.

Each Bidder must be appropriately licensed as a Contractor in the State of Tennessee as provided in T.C.A. 62-6-101. The Bidder's name, license number, expiration date, and that part of the contracting classification applying to the Bid shall appear on the sealed envelope containing the Bid; otherwise, the Bid shall not be opened.

The City of White House reserves the right to reject any or all Bid proposals and to waive all informalities. A conditional or qualified BID will not be accepted. Award will be made to the lowest responsible, responsive BIDDER.

W. Joe Moss,
Director of Public Services
City of White House

SUGGESTED INSTRUCTIONS TO BIDDERS

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ARTICLE 1 – DEFINED TERMS

1.01 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:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued.

City of White House – 105 College Street, White House, Tennessee 37188. Attn: Derek Watson

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

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

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit with its Bid (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:

A. Evidence of Bidder's authority to do business in the state where the Project is located.

B. Bidder's state or other contractor license number.

C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others," if applicable.

3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

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

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 Existing Site Conditions

- A. Subsurface and Physical Conditions; Hazardous Environmental Conditions
No data is available for subsurface and physical conditions, or hazardous environment. The City makes no recommendations or warranties. The Bidder may request site access to make determinations at the Bidder's expense prior to Bid.
- B. Geotechnical Baseline Report: No data is available for subsurface and physical conditions, or hazardous environment. The City makes no recommendations or warranties. The Bidder may request site access to make determinations at the Bidder's expense prior to Bid.
- C. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- D. Adequacy of Data: 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 5.03, 5.04, and 5.05 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 5.06 of the General Conditions.

4.03 Site Visit and Testing by Bidders

- A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.
- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

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

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. consider the information known to Bidder itself; 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 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; and (3) Bidder's safety precautions and programs;
- E. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid 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 bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- F. 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;
- G. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- H. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- I. agree that the 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 and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A pre-Bid conference will be held on August 30, 2017 at 10:00 a.m. at Hwy 76 and Sage Road. Parking is available on the southwest corner of the intersection.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

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

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and 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 released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, 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.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within ten days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

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

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Substantial Completion or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or “or-equal” item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.
- 11.03 If an award is made, Contractor shall be allowed to submit proposed substitutes and “or-equals” in accordance with the General Conditions.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 If required by the bid documents, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the Work.
- 12.02 If requested by Owner, a list of Subcontractors shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. 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 an acceptable substitute, in which case apparent Successful Bidder shall submit a 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.
- 12.03 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, or other individuals or entities. Declining to make requested substitutions will 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 subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.
- 12.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
 - A. All blanks on the Bid Form shall be completed in 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 section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 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 partnership's address for receiving notices shall be shown.
- 13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.
- 13.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.
- 13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.
- 13.07 All names shall be printed in ink below the signatures.
- 13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, 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, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 *Sectional Bids: Contracts A & B.*

- A. Bidders may submit a Bid on any individual section or any combination of sections, as set forth in the Bid Form.
- B. Submission of a Bid on any section signifies Bidder's willingness to enter into a Contract for that section alone at the price offered.
- C. If Bidder submits Bids on individual sections and a Bid based on a combination of those sections, such combined Bid need not be the sum of the Bids on the individual sections.
- D. Bidders offering a Bid on one or more sections shall be capable of completing the Work covered by those sections within the time period stated in the Agreement.

14.02 *Unit Price: Contract A*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total

will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

- C. 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.

14.03 *Lump Sum: Contract B*

- A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement for bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid shall be addressed to Derek Watson, Purchasing Coordinator, City of White House, 105 College Street, White House, Tennessee 37188.
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be 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. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. 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.
 - B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner shall announce to all bidders a “Base Bid plus alternates” budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.
 - C. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds and insurance.

When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES - NOT APPLICABLE

ARTICLE 23 – RETAINAGE

23.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement.

Document:Tenn. Code Ann. § 66-34-103

Tenn. Code Ann. § 66-34-103

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Current through the 2018 Regular Session. The commission may make editorial changes to this version and may relocate or redesignate text. Those changes will appear on Lexis Advance after the publication of the certified volumes and supplements. Pursuant to TCA 1-1-110, 1-1-111, and 1-2-114 the Tennessee Code Commission certifies the final, official version of the Tennessee Code. Until the annual issuance of the certified volumes and supplements, references to the updates made by the most recent legislative session should be to the

**Tennessee Code Annotated Title 66 Property Chapter 34 Prompt Pay Act Part 1
General Provisions**

66-34-103. Withholding of retainage -- Violations -- Penalties.

(a) All construction contracts on any project in this state, both public and private, may provide for the withholding of retainage; provided, however, that the retainage amount may not exceed five percent (5%) of the amount of the contract.

(b) The owner, whether public or private, shall release and pay all retainages for work completed pursuant to the terms of any contract to the prime contractor within ninety (90) days after completion of the work or within ninety (90) days after substantial completion of the project for work completed, whichever occurs first. As used in this subsection (b), work completed shall be construed to mean the completion of the scope of the work and all terms and conditions covered by the contract under which the retainage is being held. The prime contractor shall pay all retainages due any subcontractor within ten (10) days after receipt of the retainages from the owner. Any subcontractor receiving the retainage from the prime contractor shall pay to any subsubcontractor or material supplier all retainages due the subsubcontractor or material supplier within ten (10) days after receipt of the retainages.

(c) Any default in the making of the payments shall be subject to those remedies provided in this part.

(d) In the event that an owner or prime contractor withholds retainage that is for the use and benefit of the prime contractor or its subcontractors pursuant to § 66-34-104(a) and (b), neither the prime contractor nor any of its subcontractors shall be required to deposit additional retained funds into an escrow account in accordance with § 66-34-104(a) and (b).

(e)

(1) It is an offense for a person, firm or corporation to fail to comply with subsection (a) or (b) or § 66-34-104(a).

(2)

(A) A violation of this subsection (e) is a Class A misdemeanor, subject to a fine only of three thousand dollars (\$3,000).

(B) Each day a person, firm or corporation fails to comply with subsection (a) or (b) or § 66-34-104(a) is a separate violation of this subsection (e).

(C) Until the violation of this subsection (e) is remediated by compliance, the punishment for each violation shall be consecutive to all other such violations.

(3) In addition to the fine imposed pursuant to subdivisions (e)(2)(A) and (B), the court shall order restitution be made to the owner of the retained funds. In determining the appropriate amount of restitution, the formula stated in § 40-35-304 shall be used.

History

Acts 2007, ch. 201, § 3; 2008, ch. 804, § 3; 2012, ch. 609, § 1.

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Document:Tenn. Code Ann. § 66-34-104

Tenn. Code Ann. § 66-34-104

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**Tennessee Code Annotated Title 66 Property Chapter 34 Prompt Pay Act Part 1
General Provisions**

66-34-104. Retention of portion of contract price in escrow -- Applicability -- Mandatory compliance.

- (a)** Whenever, in any contract for the improvement of real property, a certain amount or percentage of the contract price is retained, that retained amount shall be deposited in a separate, interest-bearing, escrow account with a third party which must be established upon the withholding of any retainage.
- (b)** As of the time of the withholding of the retained funds, the funds shall become the sole and separate property of the prime contractor or remote contractor to whom they are owed, subject to the rights of the person withholding the retainage in the event the prime contractor or remote contractor otherwise entitled to the funds defaults on or does not complete its contract.
- (c)** In the event that the party withholding the retained funds fails to deposit the funds into an escrow account as provided herein, such party shall be responsible for paying the owner of the retained funds an additional three hundred dollar (\$300) penalty per day for each and every day that such retained funds are not deposited into such escrow account.

(d) The party with the responsibility for depositing the retained amount in a separate, interest-bearing, escrow account with a third party shall have the affirmative duty to provide written notice that it has complied with the requirements of this section to any prime contractor upon withholding the amount of retained funds from each and every application for payment, including:

(1) Identification of the name of the financial institution with whom the escrow account has been established;

(2) Account number; and

(3) Amount of retained funds that are deposited in the escrow account with the third party.

(e) Upon satisfactory completion of the contract, to be evidenced by a written release by the owner or prime contractor owing the retainage, all funds accumulated in the escrow account together with all interest on the account shall be paid immediately to the prime contractor or remote contractor to whom the funds and interest are owed.

(f) In the event the owner or prime contractor, as applicable, fails or refuses to execute the release provided for in subsection (c), then the prime contractor or remote contractor, as applicable, may seek any remedy in a court of proper jurisdiction and the person holding the fund as escrow agent shall bear no liability for the nonpayment of the fund to the prime contractor or remote contractor; provided, however, that all claims, demands, disputes, controversies, and differences that may arise between the owner, prime contractor or prime contractors, and remote contractor or remote contractors regarding the funds may be, upon written agreement of all parties concerned, settled by arbitration conducted pursuant to the Tennessee Uniform Arbitration Act, compiled in title 4, chapter 5, part 3, or the Federal Arbitration Act (9 U.S.C. § 1, et seq.), as may be applicable.

(g) In contracts to which the state or any department, board or agency of the state, including the University of Tennessee, is a party, interest shall be paid on the retained amounts at the same rate interest is paid on the funds of local governments participating in the local government investment pool established pursuant to § 9-4-704, for the contract period.

(h) This section shall be applicable to the state, any department, board or agency of the state, including the University of Tennessee, and all counties and municipalities and all departments, boards or agencies of the counties and municipalities, including all school and education boards, and any other subdivision of the state.

(i) This section shall be applicable to all prime contracts and all subcontracts thereunder for the improvement of real property when the contract amount of such prime contract is five hundred thousand dollars (\$500,000) or greater, notwithstanding the amount of such subcontracts.

(j) Compliance with this section shall be mandatory, and may not be waived by contract.

(k) Failure to deposit the retained funds into an escrow account as provided herein, within seven (7) days' receipt of written notice regarding such failure, is a Class A misdemeanor.

History

Acts 1975, ch. 345, §§ 1-4; T.C.A., §§ 64-1148 -- 64-1151; Acts 1985, ch. 340, §§ 1, 2; 1986, ch. 551, § 9; 2007, ch. 189, § 43; 2007, ch. 201, §§ 1, 2; T.C.A. § 66-11-144; Acts 2008, ch. 804, §§ 1, 2; 2010, ch. 875, §§ 1, 2; 2012, ch. 609, §§ 2-5.

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Document:Tenn. Code Ann. § 66-34-203

Tenn. Code Ann. § 66-34-203

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**Tennessee Code Annotated Title 66 Property Chapter 34 Prompt Pay Act Part 2
Owner/Contractor Payment**

66-34-203. Withholding of payment or retainage by owner.

Nothing in this chapter shall prevent the owner from reasonably withholding payment or a portion of a payment to the contractor; provided, that such withholding is in accordance with the written contract between the owner and the contractor. The owner may also withhold a reasonable amount of retainage as specified in the written contract between the owner and the contractor; provided, however, that the retainage amount may not exceed five percent (5%) of the amount of the contract.

History

Acts 1991, ch. 45, § 1; 2007, ch. 201, § 4.

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IRAN DIVESTMENT ACT

In compliance with the Iran Divestment Act (State of Tennessee 2016, Public Chapter No. 817), which became effective on July 1, 2016, certification is required of all bidders on contracts over \$1,000.

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party hereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to T.C.A. § 12-12-106.

I affirm, under the penalties of perjury, this statement to be true and correct.

_____	_____
Date	Signature of Bidder
_____	_____
	Company

A bid shall not be considered for award, nor shall an award be made where the foregoing certification has been complied with; provided, however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefor. The City of Waverly may award a bid to a bidder who cannot make the certification, on case-by-case basis, if:

1. The investment activities in Iran were made before July 1, 2016, the investment activities in Iran have not been expanded or reviewed on or after July 1, 2016, and the person has adopted, publicized, and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or
2. The City of Waverly makes a determination that the goods or services are necessary for the City of Waverly to perform its functions and that, absent such an exemption, the political subdivision will be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

U.S. Environmental Protection Agency

CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

I am unable to certify to the above statements. My explanation is attached.

U.S. Environmental Protection Agency

CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

I am unable to certify to the above statements. My explanation is attached.

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded after May 27, 2008

GUIDANCE DOCUMENT

Items included in the Guidance Document:

- **General Contract Administration Provisions Table**
- **Six Good Faith Efforts, Purpose and Definitions Table**
- **List of DBE Forms for Loans Awarded After May 27, 2008**

GENERAL CONTRACT ADMINISTRATION PROVISIONS—www.epa.gov			
Requirement	Circumstance	Responsible Party:	Submitted To:
A Loan Recipient must be notified in writing by its Prime Contractor prior to any termination of a DBE Subcontractor for convenience by the Prime Contractor .	Termination of a DBE Subcontractor for convenience by the Prime Contractor	Prime Contractor	Loan Recipient
A Loan Recipient must require its Prime Contractor to pay its Subcontractor for satisfactory performance no more than 30 days from the Prime Contractor's receipt of payment from the Loan Recipient .	DBE Subcontractor's satisfactory performance	Loan Recipient Prime Contractor	DBE Subcontractor
If a DBE Subcontractor fails to complete work under the subcontract for any reason, the Loan Recipient must require the Prime Contractor to employ the Six Good Faith Efforts (see Table below) if soliciting a replacement Subcontractor .	DBE Subcontractor fails to complete work under the subcontract for any reason and will be replaced	Loan Recipient Prime Contractor	SRF Loan Program
A Loan Recipient must require its Prime Contractor to employ the Six Good Faith Efforts (see Table below) even if the Prime Contractor has achieved its fair share objectives.	Employment of the Six Good Faith Efforts	Loan Recipient Prime Contractor	SRF Loan Program
Inclusion, completion, and/or transmittal of required DBE Forms as instructed below: Loan Recipient Requirements Bidder Requirements DBE Participation/Certification Summary Advertisement for Bids and Publisher's Affidavit 10 Certified Letters and Return Receipts to certified DBEs Good Faith Letter Prime Contractor's Notice Letter for EPA Form 6100-2 EPA Form 6100-2 EPA Form 6100-3 EPA Form 6100-4	---	Loan Recipient Prime Contractor DBE Subcontractor	See instructions below and on Forms

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded after May 27, 2008

GUIDANCE DOCUMENT

SIX GOOD FAITH EFFORTS—www.epa.gov	
PURPOSE	The Good Faith Efforts are required methods employed by all EPA financial assistance agreement recipients to ensure that all disadvantaged business enterprises (DBEs) have the opportunity to compete for procurements funded by EPA financial assistance dollars.
Definitions	
EFFORT 1	Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
EFFORT 2	Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
EFFORT 3	Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
EFFORT 4	Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
EFFORT 5	Use the services and assistance of the Small Business Administration (SBA) and the Minority Business Development Agency of the Department of Commerce.
EFFORT 6	If the Prime Contractor awards subcontracts, require the Prime Contractor to take the steps in the Good Faith Efforts 1 through 5 (above) and in the <u>General Contract Administration Provisions</u> (above).

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded after May 27, 2008

GUIDANCE DOCUMENT

DBE FORMS FOR SRF LOANS AWARDED AFTER MAY 27, 2008—www.epa.gov				
Form	Requirement	Provided By:	Completed By:	Submitted To:
List of certified DBE contractors, subcontractors, supplies vendors, equipment vendors, and service providers	Keep list with project files/information for duration of project	SRF Loan Program	---	---
Loan Recipient's Requirements regarding DBEs	Include this information sheet in the Information for Bidders section of bid documents	SRF Loan Program	---	To be included in the contract specifications book
Bidder's Requirements regarding DBEs	Include this information sheet in the Information for Bidders section of bid documents	SRF Loan Program	---	To be included in the contract specifications book
Loan Recipient's Certification and Summary of DBE Participation	To be completed and submitted with the Authority-to-Award/ Bid Package. The SRF Loan Program must be notified of any changes, additions, or deletions to the contract during construction.	SRF Loan Program	Loan Recipient	SRF Loan Program
Advertisement for Bids and Publisher's Affidavit	DBE solicitation information must be included in the actual advertisement for bids. A Publisher's Affidavit (signed, original, notarized certification of publication) denoting the actual published date of the advertisement will be submitted to the SRF Loan Program as part of the Authority-to-Award/Bid Package documents.	An example advertisement with appropriate DBE language is supplied to the Loan Recipient by the SRF Loan Program	Loan Recipient	A copy of the actual advertisement and a Publisher's Affidavit will be submitted to the SRF Loan Program as part of the Authority-to-Award/Bid Package documents
10 Certified Letters and Return Receipts to potential certified DBE subcontractors, supplies vendors, service providers, and/or equipment vendors	These certified letters and copies of the corresponding return mail receipts are submitted with the completed Loan Recipient's DBE Participation and Certification Summary Form.	Prime Contractor and/or Loan Recipient	Loan Recipient	SRF Loan Program as part of the Authority-to-Award/Bid Package documents
Good Faith Letter	If no DBE participation is obtained for the contract, the "Good Faith" letter must be written.	Form letter provided by the SRF Loan Program	Loan Recipient	SRF Loan Program

Disadvantaged Business Enterprise (DBE) Requirements
for
State Revolving Fund Loans Awarded after May 27, 2008

GUIDANCE DOCUMENT

DBE FORMS FOR SRF LOANS AWARDED AFTER MAY 27, 2008—www.epa.gov				
Form	Requirement	Provided By:	Completed By:	Submitted To:
Prime Contractor's Notice Letter for EPA Form 6100-2	The Prime Contractor must submit the Notice Letter to verify that Form 6100-2 was supplied to all DBE Subcontractors participating in the contract.	SRF Loan Program	Prime Contractor	Loan Recipient for inclusion in the Authority-to-Award / Bid / Proposal package
EPA Form 6100-2	Loan Recipient required to have Prime Contractors provide form to DBE Subcontractors This form gives a DBE Subcontractor the opportunity to describe the work the DBE Subcontractor received from the Prime Contractor , how much the DBE Subcontractor was paid, and any other concerns the DBE Subcontractor might have.	Loan Recipient Prime Contractors	DBE Subcontractors	EPA DBE Coordinator at the conclusion of DBE Subcontractor participation in the project (Address on Form)
EPA Form 6100-3	Loan Recipient required to have Prime Contractors provide form to DBE Subcontractors This form captures an intended Subcontractor's description of work to be performed for the Prime Contractor and the price of the work submitted to the Prime Contractor .	Loan Recipient	Prime Contractors DBE Subcontractors	Loan Recipient for inclusion in the Authority-to-Award / Bid / Proposal package
EPA Form 6100-4	Loan Recipient required to have Prime Contractors complete the form This form captures the Prime Contractor's intended use of an identified DBE Subcontractor and the estimated dollar amount of the subcontract.	Loan Recipient	Prime Contractors	Loan Recipient for inclusion in the Authority-to-Award / Bid / Proposal package

Loan Recipient's Requirements for Solicitation and Documentation
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

A goal-oriented system has been established to promote **Disadvantaged Business Enterprises (DBE)** participation by providing construction services, professional services, supplies, and/or equipment on SRF Loan-funded water and wastewater projects. It is the Loan Recipient's responsibility to ensure that Bidders make a good faith effort during the bidding phase to solicit for subcontractor participation by **DBE** subcontractors, service professionals, suppliers, and/or equipment vendors on all SRF-funded projects.

DEFINITIONS

DBE - Minority Business Enterprise (MBE): A qualified socially and economically disadvantaged minority-owned business certified by any State or Federal agency, such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

DBE - Women's Business Enterprise (WBE): A qualified independent business at least 51% owned by a woman or women and certified by any State or Federal agency such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

Fair-Share Goals: The MBE fair-share goal is 2.6% for construction and 5.2% for supplies, services, and equipment. The WBE fair share goal is 2.6% for construction and 5.2% for supplies, services, and equipment.

INSTRUCTIONS TO LOAN RECIPIENTS

Pre-Bid Requirements

Loan Recipients must include the SRF Loan Program's "Bidder's Requirements for Solicitation and Documentation of **DBE** Participation on SRF-Funded Projects" information sheet in the Information for Bidders section of bid documents. Loan Recipients must also ensure that Bidders take the following affirmative steps that constitute a good-faith effort to secure **DBE** participation:

- Include certified **DBEs** on solicitation lists whenever they are potential sources,
- Divide construction contracts into subcontracts, when economically feasible, to encourage maximum participation by **DBEs**,
- Establish delivery schedules, where requirements of the work permit, that encourage participation by **DBEs**,
- Use the services and assistance of the Office of Minority Business Enterprises of the U.S. Department of Commerce, or the U.S. EPA's Office of Small and Disadvantaged Business Utilization. For assistance or information, Bidders may be referred to:

Tennessee Department of Transportation
Small Business Development
505 Deaderick Street, Suite 1800
Nashville, TN 37243-0347
(615) 741-3681
http://www.tdot.state.tn.us/construction/DBE%20list/dbe_list.pdf

Mr. W. Clinton Smith, District Director
U.S. Small Business Administration
50 Vantage Way, Suite 201
Nashville, TN 37228
(615) 736-5881
<http://pro-net.sba.gov/>

Ms. Jeanette L. Brown, Director
U.S. Environmental Protection Agency
Office of Small and Disadvantaged Business Utilization
1200 Pennsylvania Avenue, N.W. (1230A)
Washington, D.C. 20460
(202) 564-4100
<http://www.epa.gov/osdbu/>

POST-BID REQUIREMENTS

Whether or not DBE participation was obtained, the Loan Recipient must complete the "**Loan Recipient's Certification and Summary**" form for every contract detailing whether or not **DBE** participation of subcontractors, professional service providers, suppliers, and/or equipment vendors was obtained. The "**Loan Recipient's Certification and Summary**" form must be submitted to the Administrative Section of the SRF Loan Program prior to the award of any construction contract(s) along with the newspaper **advertisement**, a **Publisher's Affidavit**, and **return receipts** and copies of the **certified letters** that were mailed to a minimum of 10 qualified **DBEs**.

Loan Recipient's Requirements for Solicitation and Documentation
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

If DBE participation was obtained, the “**Loan Recipient's Certification and Summary**” form must clearly indicate whether **DBE** participation was obtained from either a subcontractor, professional service provider, supplier, and/or equipment vendor participation; identify the **DBE** firm(s) to be used; and certify that the **DBE** firm(s) is a certified **DBE**. In addition to the “**Loan Recipient's Certification and Summary**” form, the Loan Recipient must include in the submittal to the SRF Loan Program, copies of the **Prime Contractor's Notice Letter for EPA Form 6100-2, EPA Form 6100-3, and EPA Form 6100-4**.

If no DBE participation was obtained, the Loan Recipient must submit a separate letter documenting that a “**good-faith effort**” was made to secure **DBE** participation. This letter is submitted along with the above-mentioned “**Loan Recipient's Certification and Summary**” form, newspaper **advertisement, Publisher's Affidavit, return receipts**, and copies of the **certified letters**. The SRF Loan Program provides a template to the Loan Recipient for this letter.

This documentation is the only form of documentation that will be accepted by the SRF Loan Program. Failure to provide the required documentation may result in a delay of the SRF Loan Program's approval of the Authority-to-Award/Bid Package, thereby delaying the award of the construction contract(s).

The Loan Recipient should direct all inquiries regarding the SRF Loan Program's requirements for **DBE** solicitation and documentation to Dr Bagher Sami at (615) 532-0445, bagher.sami@state.tn.us, or the following address:

Dr. Bagher Sami, Manager
Administrative Section
Tennessee State Revolving Fund Loan Program
L&C Tower, 8th Floor
401 Church St.
Nashville, TN 37243

STATE REVOLVING FUND LOAN PROGRAM

Loan Recipient's Good Faith Effort Letter for DBE Participation

(Insert on Loan Recipient's Letterhead)

(Date)

Dr. Bagher Sami, Manager
Administrative and Financial Sections
State Revolving Fund Loan Program
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 12th Floor
Nashville, TN 37243

RE: Good Faith Effort – Disadvantaged Business Enterprises (DBE) Participation
City/County/UD/Authority (?? County), Tennessee
Loan No. SRF/CWA/CGA/DWF/DWA/DGA 20??-???
Contract No. ????, Contract Description

Dear Dr. Sami:

This letter is to inform you that the **City/County/UD/Authority** did, in good faith, encourage Disadvantaged Business Enterprises (DBE) to participate in the above referenced project by placing a special notice to Disadvantaged Business Enterprises (DBE) firms in both the invitation to bid and the public advertisement for bids. The **City/County/UD/Authority**, through the consulting engineer, **(A/E Consulting Firm)**, sent a copy of the invitation to bid and a set of contract documents to the Office of Minority Business Enterprises. The **City/County/UD/Authority** also sent certified letters, return receipts requested, to a minimum of ten (10) DBE potential subcontractors, professional service providers, suppliers, and equipment vendors requesting DBE participation through their office, A/E, or their contractor. The consulting engineer on this project is **(Name), (Firm)**.

We have not received any DBE participation; we believe we have done a good faith effort.

If you have any questions, please don't hesitate to contact us.

Sincerely,

(Authorized Representative Name)

(Authorized Representative Title)

cc: **(A/E Consultant Name and Firm)**

Loan Recipient's Certification and Summary
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

SRF Loan Recipient: _____ SRF Loan No. _____

INSTRUCTIONS TO SRF LOAN RECIPIENTS

The SRF Loan Recipient's Authorized Representative must clearly indicate the Contractor's **Disadvantaged Business Enterprises (DBE)** participation results by placing a check in the appropriate box below. The remainder of the form must be completed **if DBE (Minority Business Enterprise-MBE or Women's Business Enterprise -WBE)** participation was obtained. The form must be signed and dated and returned to Dr. Bagher Sami of the Administrative Section of the SRF Loan Program.

The **completed Form** must be accompanied by **copies of the certified letters** sent from the selected Bidder to a minimum of 10 qualified DBE potential subcontractors, supplies vendor, services provider, and/or equipment vendors, and **copies of the corresponding return mail receipts**.

The SRF Loan Program must be notified of any changes, additions, or deletions to the contract during construction.

No, Disadvantaged Business Enterprises (DBE) participation was not obtained for this SRF-funded project. I certify that a good-faith effort was made to solicit **DBE** participation in accordance with the four affirmative steps outlined in the SRF Loan Program's Requirements for Solicitation and Documentation of **DBE** Participation on SRF-Funded Projects. A letter documenting that a good-faith effort was made to secure **DBE** participation has been provided to the SRF Loan Program.

OR

Yes, Disadvantaged Business Enterprises (DBE) participation was obtained for this SRF-funded project. I certify that the **DBE** firms participating in this SRF-funded project are qualified in accordance with the SRF Loan Program's Requirements for Solicitation and Documentation of **DBE** Participation on SRF-Funded Projects. Below is a listing of firms to be utilized and the amounts of their respective participation.

1. **DBE type (circle one):** **Subcontractor,** **Supplies Vendor,** **Service Provider,** **Equipment Vendor**
DBE Name: _____
Address: _____
Subcontract Amount: \$ _____ **MBE** ____ **WBE** ____ **% of Contract \$:** _____ %

2. **DBE type (circle one):** **Subcontractor,** **Supplies Vendor,** **Service Provider,** **Equipment Vendor**
DBE Name: _____
Address: _____
Subcontract Amount: \$ _____ **MBE** ____ **WBE** ____ **% of Contract \$:** _____ %

3. **DBE type (circle one):** **Subcontractor,** **Supplies Vendor,** **Service Provider,** **Equipment Vendor**
DBE Name: _____
Address: _____
Subcontract Amount: \$ _____ **MBE** ____ **WBE** ____ **% of Contract \$:** _____ %

4. **DBE type (circle one):** **Subcontractor,** **Supplies Vendor,** **Service Provider,** **Equipment Vendor**
DBE Name: _____
Address: _____
Subcontract Amount: \$ _____ **MBE** ____ **WBE** ____ **% of Contract \$:** _____ %

PARTICIPATION SUMMARY

Total SRF Loan Amount: \$ _____ **Total Construction Contract Amount:** \$ _____
Total MBE Participation: \$ _____ **Total WBE Participation:** \$ _____

Signature and Title of SRF Loan Recipient's Authorized Representative

Date

Bidder's Requirements for Solicitation and Documentation
of
Disadvantaged Business Enterprises (DBE) Participation
On State Revolving Fund (SRF) Projects

A goal-oriented system has been established to promote **Disadvantaged Business Enterprises (DBE)** participation by providing construction services, professional services, supplies, and/or equipment on SRF Loan-funded water and wastewater projects. It is the Bidder's responsibility to make a good faith effort to secure participation by **DBE** subcontractors, professional service providers, suppliers, and/or equipment vendors.

DEFINITIONS

DBE - Minority Business Enterprise (MBE): A qualified socially and economically disadvantaged minority-owned business certified by any State or Federal agency, such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

DBE - Women's Business Enterprise (WBE): A qualified independent business at least 51% owned by a woman or women and certified by any State or Federal agency such as the Tennessee Department of Transportation, U.S. EPA's Office of Small and Disadvantaged Business Utilization, or the U.S. Small Business Administration.

Fair-Share Goals: The MBE fair-share goal is 2.6% for construction and 5.2% for supplies, services, and equipment. The WBE fair share goal is 2.6% for construction and 5.2% for supplies, services, and equipment.

INSTRUCTIONS TO BIDDERS

Pre-Bid Requirements

All Bidders must send letters by certified mail with return receipt requested to a minimum of 10 certified **DBE** subcontractors, professional service providers, suppliers, and/or equipment vendors to solicit their subcontract participation in the work. Lists of certified **DBE** firms may be obtained from various State and Federal agencies, including the following:

Tennessee Department of Transportation
Small Business Development
505 Deaderick Street, Suite 1800
Nashville, TN 37243-0347
(615) 741-3681

http://www.tdot.state.tn.us/construction/DBE%20list/dbe_list.pdf

Mr. W. Clinton Smith, District Director
U.S. Small Business Administration
50 Vantage Way, Suite 201
Nashville, TN 37228
(615) 736-5881

<http://pro-net.sba.gov/>

U.S. Environmental Protection Agency
Office of Small and Disadvantaged Business Utilization
1200 Pennsylvania Avenue, N.W. (1230A)
Washington, D.C. 20460
(202) 564-4100
<http://www.epa.gov/osdbu/>

Post-Bid Requirements

Whether or not DBE participation was obtained, the successful Bidder (Prime Contractor) must maintain supporting documents such as certification lists, solicitation documents, letters of intent, contracts, etc., for the duration of the project.

If DBE participation was obtained, the apparent successful Bidder must identify to the Loan Recipient all **DBE** firms to be utilized on the contract and the respective **DBE** type--subcontractors, supplies vendors, service providers, and/or equipment vendors (see "Loan Recipient's Certification and Summary" form). Copies of the State's or Federal agency's **DBE** certification list(s) identifying that the **DBE** firms are certified minority or women's business enterprises must be provided to the Loan Recipient. In addition, copies of the **Prime Contractor's Notice Letter for EPA Form 6100-2, EPA Form 6100-3** (to be co-completed by the Prime Contractor and each DBE subcontractor), and **EPA Form 6100-4** must also be provided to the Loan Recipient prior to tentative loan award. The Prime Contractor must provide **EPA Form 6100-2** to each **DBE** utilized on the contract.

If no DBE participation was obtained by the apparent successful Bidder, it remains the responsibility of the Prime Contractor to provide documentation to the Loan Recipient, prior to contract award, that a good faith effort was made to obtain **DBE** participation. Copies of the **certified letters** sent to a minimum of 10 qualified **DBE** potential subcontractors, supplies vendors, service providers, and/or equipment vendors and the corresponding **return mail receipts** are the only documentation of a good-faith effort that will be acceptable to the Loan Recipient.

*Failure to provide the required certified letters, return receipts, State or Federal agency **DBE** certification list(s), **Prime Contractor's Notice Letter for EPA Form 6100-2, EPA Form 6100-3, and EPA Form 6100-4** to the Loan Recipient may delay the contract award until the required documentation has been provided to and accepted by the Loan Recipient.*

STATE REVOLVING FUND LOAN PROGRAM

Contractor Receipt Letter – Form 6100-2

(Please Insert on Contractor Letterhead)

(Date)

Dr. Bagher Sami, Manager
Administrative and Financial Sections
State Revolving Fund Loan Program
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 12th Floor
Nashville, TN 37243

RE: Receipt and Distribution of EPA Form 6100-2
Disadvantaged Business Enterprise (DBE) Participation
(City/County/UD/Authority) (??? County), Tennessee
Loan No. SRF/CWA/CGA/DWF/DWA/DGA 20??-???
(Contract Name and/or Number)

Dear Dr. Sami:

This letter is to inform you the EPA Form 6100-2 was received from the **(City/County/UD/Authority)** and was then given to all DBE Subcontractors as required who are going to provide either construction, services, supplies, or equipment for this project.

If you have any questions concerning this notification, please contact us at **(Phone No., e-mail, etc.)**.

Sincerely,

(Contractors Authorized Representative)

(Title)

cc: **(Consulting Engineer for the contract)**
(City/County/UD/Authority's Authorized Representative)

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

Please use the space below to report any concerns regarding the above EPA-funded project:

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: ___ DOT ___ SBA ___ Other: _____		Meets/ exceeds EPA certification standards? ___ YES ___ NO ___ Unknown

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity:			

I have identified potential DBE certified subcontractors	__ YES	__ NO	
If yes, please complete the table below. If no, please explain:			
Subcontractor Name/ Company Name	Company Address/ Phone/ Email	Est. Dollar Amt	Currently DBE Certified?

Continue on back if needed

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

TENNESSEE DEPARTMENT OF TRANSPORTATION (TDOT)

Certified Disadvantaged Business Enterprises (DBE) List

Below is the link to the Tennessee Department of Transportation (TDOT) Web Page for the Certified DBE List. This certified list is periodically updated by TDOT.

Here is the link: <http://www.tdot.state.tn.us/dbedirectinternet/Vendor.aspx>

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

Office of Federal Programs
Wm. R. Snodgrass TN Tower Building
26th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243
(877) 768-6374

or contact the U.S. Department of Labor's Wage and Hour Division.



For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

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For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

DERECHOS DEL EMPLEADO BAJO LA LEY DAVIS-BACON

PARA OBREROS Y MECÁNICOS EMPLEADOS EN PROYECTOS DE CONSTRUCCIÓN FEDERAL O CON ASISTENCIA FEDERAL

LA SECCIÓN DE HORAS Y SUELDOS DEL DEPARTAMENTO DE TRABAJO DE EEUU

SALARIOS PREVALECIENTES

No se le puede pagar menos de la tasa de pago indicada en la Decisión de Salarios Davis-Bacon fijada con este Aviso para el trabajo que Ud. desempeña.

SOBRETIEMPO

Se le ha de pagar no menos de tiempo y medio de su tasa básica de pago por todas las horas trabajadas en exceso de 40 en una semana laboral. Existen pocas excepciones.

CUMPLIMIENTO

Se pueden retener pagos por contratos para asegurarse que los obreros reciban los salarios y el pago de sobretiempo debidos, y se podría aplicar daños y perjuicios si no se cumple con las exigencias del pago de sobretiempo. Las cláusulas contractuales de Davis-Bacon permiten la terminación y exclusión de contratistas para efectuar futuros contratos federales hasta tres años. El contratista que falsifique los registros certificados de las nóminas de pago o induzca devoluciones de salarios puede ser sujeto a procesamiento civil o criminal, multas y/o encarcelamiento.

APRENDICES

Las tasas de aprendices sólo se aplican a aprendices correctamente inscritos bajo programas federales o estatales aprobados.

PAGO APROPIADO

Si Ud. no recibe el pago apropiado, o precisa de información adicional sobre los salarios aplicables, póngase en contacto con el Contratista Oficial que aparece abajo:

o póngase en contacto con la Sección de Horas y Sueldos del Departamento de Trabajo de EEUU.



Para obtener información adicional:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627




WWW.WAGEHOUR.DOL.GOV



MAR 22 2013

MEMORANDUM NO. 213

TO: ALL CONTRACTING AGENCIES OF THE FEDERAL
GOVERNMENT AND THE DISTRICT OF COLUMBIA

FROM: 
MARY BETH MAXWELL
Acting Deputy Administrator

SUBJECT: Application of the Davis-Bacon and Related Acts requirement that wage rates for additional classifications, when “conformed” to an existing wage determination, bear a “reasonable relationship” to the wage rates in that wage determination

This Memorandum is notification from the Department of Labor’s Wage and Hour Division (WHD) of the proper application of the Davis-Bacon and Related Acts (DBRA) requirements for wage rates for additional classifications that are “conformed” to an existing wage determination by agency contracting officers. The regulations at 29 C.F.R. § 5.5(a)(1)(ii)(A) provide that contracting officers shall approve an additional classification and its proposed wage rate in conformance with an existing wage determination only when the work to be performed by the proposed classification is not performed by a classification in the wage determination and the proposed wage rate bears a “reasonable relationship” to the wages rates in the wage determination. Although this Memorandum primarily focuses on the “reasonable relationship” requirement, it is essential at the threshold to reiterate that a conformance is not appropriate when the work of the proposed classification is already performed by a classification on the wage determination. The conformance process is narrow in scope and has the limited purpose of establishing a new classification when it is necessary to do so because work needed to perform the contract is not performed by an existing classification. *See Cambridge Plaza*, ARB Case No. 07-102 (ARB Oct. 29, 2009). Accordingly, the WHD will not add a new classification through a conformance action unless the first criterion for issuance of a conformance is satisfied, i.e., the proposed work in question is not performed by any classification in the existing wage determination. 29 C.F.R. § 5.5(a)(1)(ii)(A)(1).

In those circumstances in which the duties of the proposed classification are not performed by any classification in the existing wage determination, the WHD will consider whether the proposed wage rate bears a “reasonable relationship” to the wage rates in the wage determination. In the past, WHD has generally approved proposed wage rates for a conformed skilled craft and a power equipment operator when such rates were not less than the rate for the lowest classification in the respective category on the contract wage determination. The practice of using the lowest rate in the relevant category as a benchmark also occurred on occasion with laborers and truck drivers. In keeping with the remedial purpose of the DBRA and the governing

regulations, the wage rate of the lowest skilled craft, laborer, power equipment operator, or truck driver classification on the contract wage determination has no longer been an automatic benchmark when reviewing conformance requests. WHD's approach of not using the lowest wage rate as a benchmark has been progressively implemented over the last year.

The Conformance Process

In accordance with 29 C.F.R. § 5.5(a)(1)(ii)(A), the contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and a wage rate (including fringe benefits) for the classification only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

Further, if the contractor, the laborers or mechanics (if known) to be employed in the classification or their representatives, and the contracting agency agree on the classification and wage rate proposed, a report of the action taken is sent by the contracting officer to the Administrator of WHD for approval, denial, or modification. The Administrator (or an authorized representative) shall respond within 30 days of receipt, or the contracting officer will be notified that more time is necessary. *See* 29 C.F.R. § 5.5(a)(1)(ii)(B). In the event that the contractor, the laborers or mechanics (if known) to be employed in the classification or their representatives, and the contracting agency do not agree on the classification and wage rate proposed, the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator of WHD for determination. The Administrator (or an authorized representative) shall issue a determination within 30 days of receipt and so advise the contracting officer, or the contracting officer will be notified that more time is necessary. *See* 29 C.F.R. § 5.5(a)(1)(ii)(C).

"Reasonable Relationship"

WHD previously typically approved conformance requests from contracting officers for wage rates (including fringe benefits) for skilled classifications and power equipment operators by automatically using as a benchmark the lowest rate for a skilled classification or power equipment operator, respectively, in the applicable wage determination. The practice of using the lowest rate in the relevant category as a benchmark also occurred on occasion with laborers and truck drivers. WHD has concluded, however, that it better reflects the regulatory requirement that "the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination" to consider the entirety of the rates within the relevant category on the wage determination and to not generally use as a benchmark the lowest rate within that category. The regulation at 29 C.F.R. §

5.5(a)(1)(ii)(A)(3) requires that the proposed wage rate bear a reasonable relationship to the “wage rates” on the wage determination and not to a particular rate or the lowest rate.

The category in which the requested additional classification falls is relevant to the reasonable relationship analysis. As background, classifications in wage determinations fall into four general categories: skilled crafts, laborers, power equipment operators, and truck drivers. To determine a “reasonable relationship,” the requested additional classification is compared to the classifications on the applicable wage determination within the same category. A proposed skilled craft classification is compared to skilled classifications in the wage determination; a proposed laborer classification is compared to existing laborer classifications; a proposed power equipment operator classification is compared to existing power equipment operator classifications; and a proposed truck driver classification is compared to existing truck driver classifications. See *Mistick Construction*, ARB Case No. 02-004 (June 24, 2003); *Tower Construction*, WAB Case No. 94-17 (Feb. 28, 1995).¹ Thus, when considering a conformance request for a skilled classification, WHD generally considers the entirety of the rates for the skilled classifications on the applicable wage determination and looks to where the proposed wage rate falls within the rates listed on the wage determination. Occasionally, however, a wage determination may contain some wage rates for laborer classifications that are higher than some wage rates for the skilled classifications or power equipment operators (likely because the laborers’ rates reflect union prevailing rates and the skilled crafts’ or power equipment operators’ rates reflect weighted average prevailing rates). On such occasions, the contracting officer should look to those skilled classifications whose rates are higher than the laborer classifications’ rates. See *M.Z. Contractors Co.*, WAB Case No. 92-06 (Aug. 25, 1992). If, however, most of the skilled classifications’ or power equipment operators’ rates are lower than the laborer classifications’ rates, then it may be reasonable to propose a rate that reflects the skilled classifications’ rates even if they are lower than the laborer classifications’ rates.

Additionally, whether the wage rates in the applicable category (skilled craft, laborer, power equipment operator, truck driver) in the wage determination are predominantly union prevailing wage rates or predominantly weighted average prevailing wage rates should be considered when proposing rates for an additional classification. For example, if a wage determination contains predominantly union prevailing wage rates for skilled classifications, it typically would be appropriate to look to the union sector skilled classifications in the wage determination and the rates for those classifications when proposing a wage rate for the additional classification. Conversely, if a wage determination contains predominantly weighted average prevailing wage rates for skilled classifications, it typically would be appropriate to look to the weighted average/non-union sector skilled classifications in the wage determination and the rates for those classifications when proposing a wage rate for the additional classification. If the wage rates in the applicable category are roughly half union prevailing rates and half weighted average prevailing rates, it would typically be appropriate to look to the lowest union rate and the highest weighted average rate (assuming the union rates are higher than the weighted average rates) when proposing a wage rate.

¹ Copies of Administrative Review Board (ARB) and Wage Appeals Board (WAB) decisions can be obtained from: www.oalj.dol.gov/libdba.htm.

While the majority of conformance requests are within the skilled classification category, the governing regulations and the principles outlined in this Memorandum apply to the other categories of workers – laborers, power equipment operators, and truck drivers. To meet the “reasonable relationship” test for a conformed power equipment operator or truck driver classification, the proposed wage rate should bear a reasonable relationship to the entirety of rates within the respective classification, and in particular to the union or weighted average rates in the classification (assuming union or weighted average rates prevail for the classification). When a conformance for a laborer classification is requested, WHD generally continues to use the common laborer rate already existing in the wage determination as a benchmark for the proposed rate.

Each conformance request and corresponding wage determination involves particular circumstances and therefore should be evaluated as such. The full range of wage rates on the wage determination for the appropriate category should be reviewed in the manner discussed above. When seeking conformed classifications and wage rates, the contractor and the contracting officer should not rely on a wage determination or conformance granted to another party regardless of the similarity of the work in question. *See, e.g., Inland Waters Pollution Control, Inc.*, WAB Case No. 94-12 (Sept. 30, 1994). Moreover, the contractor and the contracting officer should not prospectively rely on WHD’s prior approval of rates for application to a contract performed at the same location. *See E&M Sales, Inc.*, WAB Case No. 91-17 (Oct. 4, 1991). Although atypical, use of the “lowest skilled” rate may of course be appropriate when that rate in fact bears a reasonable relationship to the wage rates contained in the wage determination for the appropriate category. *See, e.g., Tower Construction*, WAB Case No. 94-17 (Feb. 28, 1995) (conformed wage rate, which equaled lowest skilled rate on wage determination, was reasonable).

In sum, contracting agencies should take the following steps when proposing a wage rate for a classification to be conformed to an existing wage determination:

- First, the contracting agency should determine the category (skilled crafts, laborers, power equipment operators, or truck drivers) of the classification which is being conformed.
- Second, the contracting agency should determine for that category whether union or weighted average/non-union sector rates prevail in the existing wage determination.
- Third, after reviewing the entirety of the rates within the appropriate sector in the applicable category, the contracting agency should determine a rate that bears a reasonable relationship to those rates on the wage determination.
- Fourth, the contracting agency should determine whether any of the considerations identified in this Memorandum apply (or whether any other relevant considerations apply). For example, if the classification being conformed is a skilled classification and some of the wage rates for skilled classifications in the wage determination are lower than the rates for laborer classifications, then the contracting agency should use those existing skilled classification rates that are higher than the laborer rates to determine the

proposed rate. And if the classification which is being conformed is a laborer classification, the proposed wage rate should generally use the existing common laborer wage rate as a benchmark.

Conclusion

The WHD Administrator has historically maintained broad discretion under the regulations to make determinations regarding proposed wage rates for additional classifications that are conformed to existing wage determinations. This broad discretion has been confirmed by the ARB and its predecessors, as illustrated by the decisions cited in this Memorandum, among others. In exercising that discretion, WHD ensures that wage rates (including fringe benefits) for the classification to be conformed bear a reasonable relationship to the range of rates for the classifications in the wage determination in the same category (skilled classifications, power equipment operators, laborers, and truck drivers), and not automatically to the lowest rate in the applicable category. Consistent with the governing regulations, contracting agencies should ensure that they request wage rates (including fringe benefits) for additional classifications in accordance with the principles set forth in this Memorandum. By following the guidance in this AAM, contracting agencies and contractors will benefit by receiving approvals from WHD that ensure consistency in conformed wage rates and increase efficiencies in government.

In conjunction with the guidance provided in this AAM, WHD has posted on www.dol.gov/whd/govcontracts/dbra.htm a series of frequently asked questions that include examples which will provide additional guidance regarding the reasonable relationship requirement in the conformance process. WHD also is updating its Prevailing Wage Resource Book and will provide compliance assistance on DBRA conformances at future Prevailing Wage Conferences. In addition, WHD's Branch of Construction Wage Determinations is available to assist with any questions.

Project Wage Rate Sheet

U.S. Department of Housing and Urban Development
Office of Labor Relations

PROJECT NAME:			WAGE DECISION NUMBER/MODIFICATION NUMBER:			
PROJECT NUMBER:			PROJECT COUNTY:			
WORK CLASSIFICATION	BASIC HOURLY RATE (BHR)	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	LABORERS FRINGE BENEFITS:		\$ TOTAL WAGE
				GROUP #	BHR	
Bricklayers			\$			\$
Carpenters			\$			\$
Cement Masons			\$			\$
Drywall Hangers			\$			\$
Electricians			\$			\$
Iron Workers			\$			\$
Painters			\$	OPERATORS FRINGE BENEFITS:		\$ TOTAL WAGE
				GROUP #	BHR	
Plumbers			\$			\$
Roofers			\$			\$
Sheet Metal Workers			\$			\$
Soft Floor Layers			\$			\$
Tapers			\$			\$
Tile Setters			\$	TRUCK DRIVERS FRINGE BENEFITS:		\$ TOTAL WAGE
				GROUP #	BHR	
OTHER CLASSIFICATIONS						
			\$			\$
			\$			\$
			\$			\$
ADDITIONAL CLASSIFICATIONS (HUD Form 4230-A)						
WORK CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	DATE OF HUD SUBMISSION TO DOL	DATE OF DOL APPROVAL	
			\$			
			\$			
			\$			
			\$			

General Decision Number: TN190124 01/04/2019 TN124

Superseded General Decision Number: TN20180125

State: Tennessee

Construction Type: Heavy
Including Water and Sewer Line Construction

Counties: Giles, Houston, Humphreys, Lawrence, Lewis,
Lincoln, Marshall, Maury, Moore, Perry, Van Buren, Warren and
Wayne Counties in Tennessee.

HEAVY CONSTRUCTION PROJECTS (including sewer/water
construction).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019

* ENGI0369-011 05/01/2013

	Rates	Fringes
Operating Engineers:		
Bulldozer and Crane.....	\$ 24.47	10.85

SUTN2009-123 12/02/2009		

	Rates	Fringes
ELECTRICIAN.....	\$ 20.06	0.00
LABORER: Common or General.....	\$ 9.18	0.50

LABORER: Flagger.....	\$ 10.50	0.00
LABORER: Pipelayer.....	\$ 9.96	0.30
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 13.36	0.75
TRUCK DRIVER: Dump Truck.....	\$ 11.68	0.70

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1,

2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

STATE REVOLVING FUND LOAN PROGRAM

Bidder's Requirements

Davis-Bacon Act Wage Determination

The Loan Recipient must ensure the bidder is in compliance with the Davis-Bacon Act as outlined below. Additionally, ten (10) days prior to the scheduled bid opening date, the wage rates need to be checked to ensure they have not changed.

The Davis-Bacon Act as amended, requires that each contract over \$2,000 to which the United States or the District of Columbia is a party for the construction, alteration, or repair of public buildings or public works shall contain a clause setting forth the minimum wages to be paid to various classes of laborers and mechanics employed under the contract. Under the provisions of the Act, contractors or their subcontractors are to pay workers employed directly upon the site of the work no less than the locally prevailing wages and fringe benefits paid on projects of a similar character. The Davis-Bacon Act directs the Secretary of Labor to determine such local prevailing wage rates.

The **wage determination** (including any additional **classifications** and **wage rates** conformed) **and** a Davis-Bacon poster (WH-1321) **must be posted on the work site at all times** by the contractor and its subcontractors in a prominent and accessible place where it can be easily seen. The WH-1321 poster **may be obtained at no charge** from offices of the Wage and Hour Division.

With each **pay estimate** submitted, the contractors **must submit** a certification stating that workers have been paid the current prevailing wage rates for each classification according to the Davis-Bacon wage rate schedule currently in effect for this project.

Wage Determinations

A "wage determination" is the listing of wage rates and fringe benefit rates for each classification of laborers and mechanics which the Administrator of the Wage and Hour Division of the U.S. Department of Labor has determined to be prevailing in a given area for a particular type of construction (e.g., building, heavy, highway, or residential).

Extensions of Wage Determinations

When a general wage determination has not been awarded within 90 days after bid opening, the head of the contracting/assisting agency may request an extension of the 90 day period from the Wage and Hour Administrator. When, due to unavoidable circumstances, a project wage determination expires before award but after bid opening, the head of the contracting/assisting agency may request an extension of the expiration date of the project wage determination in the bid specifications instead of issuing a new wage determination.

Extension requests should be supported by a written finding including a brief statement of the factual support, that extension of the expiration date of the determination is necessary and proper in the public interest to prevent injustice or undue hardship or to avoid serious impairment in the conduct of Government business.

The Administrator of the Wage and Hour Division of the U.S. Department of Labor will either grant or deny the request for an extension after consideration of all the circumstances, including an examination to determine if the previously issued rates remain prevailing. If a request for the extension of a project wage determination is denied, a new wage determination will be issued to replace an expired project wage determination.

Additional information concerning the Davis-Bacon Act and current wage rate determinations can be obtained at the following sites: www.gpo.gov/davisbacon/referencemat.html and www.wdol.gov/.

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Wage Rate Requirements Under FY 2010 Appropriations

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2010 appropriation , the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

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(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

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(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or

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indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency

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recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for

the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

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(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such

laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

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(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

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Loan Recipient's Requirements

Davis-Bacon Act Wage Determination

The Loan Recipient must ensure the bidder is in compliance with the Davis-Bacon Act as outlined below. Additionally, ten (10) days prior to the scheduled bid opening date, the wage rates need to be checked to ensure they have not changed.

The Davis-Bacon Act as amended, requires that each contract over \$2,000 to which the United States or the District of Columbia is a party for the construction, alteration, or repair of public buildings or public works shall contain a clause setting forth the minimum wages to be paid to various classes of laborers and mechanics employed under the contract. Under the provisions of the Act, contractors or their subcontractors are to pay workers employed directly upon the site of the work no less than the locally prevailing wages and fringe benefits paid on projects of a similar character. The Davis-Bacon Act directs the Secretary of Labor to determine such local prevailing wage rates.

The specifications must incorporate a clause stating that the current Davis-Bacon wage rate is required (with the Davis-Bacon links and information).

The Bid Advertisement **must include** a clause that the **Davis-Bacon wage rates** are a requirement. (Refer to the ADVERTISEMENT FOR BIDS EXAMPLE – DBE, ARRA)

If modifications to the existing **wage rates** occur **ten (10) days** prior to the Bid Opening Date, the Loan Recipient **must** incorporate the proper **wage rates** into the plans and specifications by Addendum. All Bidders **must** be informed that this addendum **must** be incorporated into the plans and specifications that they have received.

However, if these modifications occur **less than ten (10) days** prior to the Bid Opening Date, these modifications **shall be effective unless** the agency **finds** that there is not a reasonable time still available before the Bid Opening to notify bidders of the modifications. (A report of this **finding** shall be inserted in the contract file.)

The **wage determination** (including any additional **classifications** and **wage rates** conformed) **and** a Davis-Bacon poster (WH-1321) **must be posted on the work site at all times** by the contractor and its subcontractors in a prominent and accessible place where it can be easily seen. The WH-1321 poster **may be obtained at no charge** from offices of the Wage and Hour Division.

With each **pay estimate** submitted, the contractors **must** certify that workers have been paid the current prevailing wage rates for each classification according to the Davis-Bacon wage rate schedule currently in effect for this project.

The loan recipients **must keep a file** in which all documentation **must be filed** for the current classifications and wage rates (under the Davis-Bacon Act) for the construction of their projects. This file must be kept for three (3) years after the project is completed and **will** be subject to audit by the State of Tennessee and the Environmental Protection Agency (EPA).

Wage Determinations

A "wage determination" is the listing of wage rates and fringe benefit rates for each classification of laborers and mechanics which the Administrator of the Wage and Hour Division of the U.S. Department of Labor has determined to be prevailing in a given area for a particular type of construction (e.g., building, heavy, highway, or residential).

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Extensions of Wage Determinations

When a general wage determination has not been awarded within 90 days after bid opening, the head of the contracting/assisting agency may request an extension of the 90 day period from the Wage and Hour Administrator. When, due to unavoidable circumstances, a project wage determination expires before award but after bid opening, the head of the contracting/assisting agency may request an extension of the expiration date of the project wage determination in the bid specifications instead of issuing a new wage determination.

Extension requests should be supported by a written finding including a brief statement of the factual support, that extension of the expiration date of the determination is necessary and proper in the public interest to prevent injustice or undue hardship or to avoid serious impairment in the conduct of Government business.

The Administrator of the Wage and Hour Division of the U.S. Department of Labor will either grant or deny the request for an extension after consideration of all the circumstances, including an examination to determine if the previously issued rates remain prevailing. If a request for the extension of a project wage determination is denied, a new wage determination will be issued to replace an expired project wage determination.

Additional information concerning the Davis-Bacon Act and current wage rate determinations can be obtained at the following sites: www.gpo.gov/davisbacon/referencemat.html and www.wdol.gov/.

Wage Rate Requirements Under FY 2010 Appropriations

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2010 appropriation, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §

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5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the

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contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g.,

STATE REVOLVING FUND LOAN PROGRAM

the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or

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with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such

laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

STATE REVOLVING FUND LOAN PROGRAM

Loan Recipient's and Contractor's Guidance

FY2010 and After

Tracking and Reporting

For tracking and reporting purposes, the **Loan Recipient** is responsible for the following:

- Ensuring that the Contractor is in compliance with the Davis Bacon provisions of ARRA
- The loan recipients **must keep a file** in which all documentation **must be stored** for the current classifications and wage rates (under the Davis-Bacon Act) for the construction of their projects. This file must be kept for three (3) years after the project is completed and **will** be subject to audit by the State of Tennessee and the Environmental Protection Agency (EPA).
- Any additional tracking and reporting requirements from EPA

For tracking and reporting purposes, the **Contractor** is responsible for the following:

- Achieving and maintaining compliance with the Davis Bacon provisions of ARRA
- Submitting with each **pay estimate** a certification stating that workers have been paid the current prevailing wage rates for each classification according to the Davis-Bacon wage rate schedule currently in effect for this project
- Any additional tracking and reporting requirements from EPA

Please contact **Dr. Bagher Sami, Administrative Section Manager for the SRF Loan Program**, at 615-532-0501 or bagher.sami@tn.gov to obtain details.



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Water Resources

William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor, Nashville, Tennessee 37243
1-888-891-8332 (TDEC)

Notice of Intent (NOI) for General NPDES Permit for Stormwater Discharges from Construction Activities (TNR100000)

Form with multiple sections: Site or Project Name, Existing NPDES Tracking Number, Street Address or Location, Site Activity Description, County(ies), MS4 Jurisdiction, Acres Disturbed, Total Acres, Receiving waters, Attach the SWPPP with the NOI, Site Owner/Developer Entity, Site Owner/Developer Signatory, Mailing Address, Optional Contact, Owner or Developer Certification, Contractor(s) Certification, Other Contractor company name.

OFFICIAL STATE USE ONLY

Form with 4 columns: Received Date, Reviewer, Field Office, Permit Number TNR, Exceptional TN Water, Fee(s), T & E Aquatic Flora and Fauna, Impaired Receiving Stream, Notice of Coverage Date.

Notice of Intent (NOI) for General NPDES Permit for Stormwater Discharges from Construction Activities (TNR10000)

Purpose of this form A completed notice of intent (NOI) must be submitted to obtain coverage under the Tennessee General NPDES Permit for Discharges of Stormwater Associated with Construction Activity (permit). **Requesting coverage under this permit means that an applicant has obtained and examined a copy of this permit, and thereby acknowledges applicant’s claim of ability to be in compliance with permit terms and conditions.** This permit is required for stormwater discharge(s) from construction activities including clearing, grading, filling and excavating (including borrow pits) of one or more acres of land. This form should be submitted at least 30 days prior to the commencement of land disturbing activities, or no later than 48 hours prior to when a new operator assumes operational control over site specifications or commences work at the site.

Permit fee (see table below) must accompany the NOI and is based on total acreage to be disturbed by an entire project, including any associated construction support activities (e.g. equipment staging yards, material storage areas, excavated material disposal areas, borrow or waste sites). There is no fee for sites less than 1 acre.

Acres Disturbed	= or > 150 acres	= or > 50 < 150 acres	= or > 5 < 50 acres	= or > 1 < 5 acres
Fee	\$7,500	\$4,000	\$1,000	\$250

Who must submit the NOI form? Per Section 2 of the permit, all site operators must submit an NOI form. “Operator” for the purpose of this permit and in the context of stormwater associated with construction activity means any person associated with a construction project who meets either or both of the following two criteria: (1) The person has operational or design control over construction plans and specifications, including the ability to make modifications to those plans and specifications. This person is typically the owner or developer of the project or a portion of the project (e.g. subsequent builder), or the person that is the current land owner of the construction site. This person is considered the primary permittee; or (2) The person has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions. This person is typically a contractor or a commercial builder who is hired by the primary permittee, and is considered a secondary permittee.

Owners, developers and all contractors that meet the definition of the operator in subsection 2.2 of the permit shall apply for permit coverage on the same NOI, insofar as possible. After permit coverage has been granted to the primary permittee, any subsequent NOI submittals must include the site’s previously assigned permit tracking number and the project name. The comprehensive site-specific SWPPP shall be prepared in accordance with the requirements of part 3 of the permit and must be submitted with the NOI unless the NOI being submitted is to only add a contractor (secondary permittee) to an existing coverage.

Notice of Coverage The division will review the NOI for completeness and accuracy and prepare a notice of coverage (NOC). Stormwater discharge from the construction site is authorized as of the effective date of the NOC.

Complete the form Type or print clearly, using ink and not markers or pencil. Answer each item or enter “NA,” for not applicable, if a particular item does not fit the circumstances or characteristics of your construction site or activity. If you need additional space, attach a separate piece of paper to the NOI form. **The NOI will be considered incomplete without a permit fee, a map, and the SWPPP.**

Describe and locate the project Use the legal or official name of the construction site. If a construction site lacks street name or route number, give the most accurate geographic information available to describe the location (reference to adjacent highways, roads and structures; e.g. intersection of state highways 70 and 100). Latitude and longitude (expressed in decimal degrees) of the center of the site can be located on USGS quadrangle maps. The quadrangle maps can be obtained at the USGS World Wide Web site: <http://www.usgs.gov/>; latitude and longitude information can be found at numerous other web sites. Attach a copy of a portion of a 7.5 minute quad map, showing location of site, with boundaries at least one mile outside the site boundaries. Provide estimated starting date of clearing activities and completion date of the project, and an estimate of the number of acres of the site on which soil will be disturbed, including borrow areas, fill areas, stockpiles and the total acres. For linear projects, give location at each end of the construction area.

MS4 Jurisdiction: If this construction site is located within a Municipal Separate Storm Sewer System (MS4), please list name of MS4. A current list of MS4s in Tennessee may be found at http://www.tn.gov/environment/wpc/stormh2o/docs/MS4s_Jan2012.pdf

Give name of the receiving waters Trace the route of stormwater runoff from the construction site and determine the name of the river(s), stream(s), creek(s), wetland(s), lake(s) or any other water course(s) into which the stormwater runoff drains. Note that the receiving water course may or may not be located on the construction site. If the first water body receiving construction site runoff is unnamed (“unnamed tributary”), determine the name of the water body that the unnamed tributary enters.

ARAP permit may be required **If your work will disturb or cause alterations of a stream or wetland, you must obtain an appropriate Aquatic Resource Alteration Permit (ARAP).** If you have a question about the ARAP program or permits, contact your local Environmental Field Office (EFO).

Submitting the form and obtaining more information Note that this form must be signed by the company President, Vice-President, or a ranking elected official in the case of a municipality, for details see subpart 2.5. For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC). Submit the completed NOI form (keep a copy for your records) to the appropriate EFO for the county(ies) where the construction activity is located, addressed to **Attention: Stormwater NOI Processing.**

EFO	Street Address	Zip Code	EFO	Street Address	Zip Code
Memphis	8383 Wolf Lake Drive, Bartlett	38133-4119	Cookeville	1221 South Willow Ave.	38506
Jackson	1625 Hollywood Drive	38305-4316	Chattanooga	540 McCallie Avenue STE 550	37402-2013
Nashville	711 R S Gass Boulevard	37243	Knoxville	3711 Middlebrook Pike	37921
Columbia	1421 Hampshire Pike	38401	Johnson City	2305 Silverdale Road	37601



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC)

Division of Water Resources

William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor, Nashville, Tennessee 37243
1-888-891-TDEC (8332)

Notice of Termination (NOT) for General NPDES Permit for Stormwater Discharges from Construction Activities (CGP)

This form is required to be submitted when requesting termination of coverage from the CGP. The purpose of this form is to notify the TDEC that either all stormwater discharges associated with construction activity from the portion of the identified facility where you, as an operator, have ceased or have been eliminated; or you are no longer an operator at the construction site. Submission of this form shall in no way relieve the permittee of permit obligations required prior to submission of this form. Please submit this form to the local WPC Environmental Field Office (EFO) address (see table below). For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC).

Type or print clearly, using ink.

Site or Project Name:	NPDES Tracking Number: TNR
Street Address or Location:	County(ies):

Name of Permittee Requesting Termination of Coverage:			
Permittee Contact Name:		Title or Position:	
Mailing Address:		City:	State: Zip:
Phone: ()		E-mail:	

Check the reason(s) for termination of permit coverage:

<input type="checkbox"/>	Stormwater discharge associated with construction activity is no longer occurring and the permitted area has a uniform 70% permanent vegetative cover OR has equivalent measures such as rip rap or geotextiles, in areas not covered with impervious surfaces.
<input type="checkbox"/>	You are no longer the operator at the construction site (i.e., termination of site-wide, primary or secondary permittee coverage).

Certification and Signature: (must be signed by president, vice-president or equivalent ranking elected official)

<p>I certify under penalty of law that either: (a) all stormwater discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or (b) I am no longer an operator at the construction site. I understand that by submitting this notice of termination, I am no longer authorized to discharge stormwater associated with construction activity under this general permit, and that discharging pollutants in stormwater associated with construction activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Clean Water Act.</p> <p>For the purposes of this certification, elimination of stormwater discharges associated with construction activity means that all stormwater discharges associated with construction activities from the identified site that are authorized by a NPDES general permit have been eliminated from the portion of the construction site where the operator had control. Specifically, this means that all disturbed soils at the portion of the construction site where the operator had control have been finally stabilized, the temporary erosion and sediment control measures have been removed, and/or subsequent operators have obtained permit coverage for the site or portions of the site where the operator had control.</p> <p>I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.</p>		
Permittee name (print or type):	Signature:	Date:

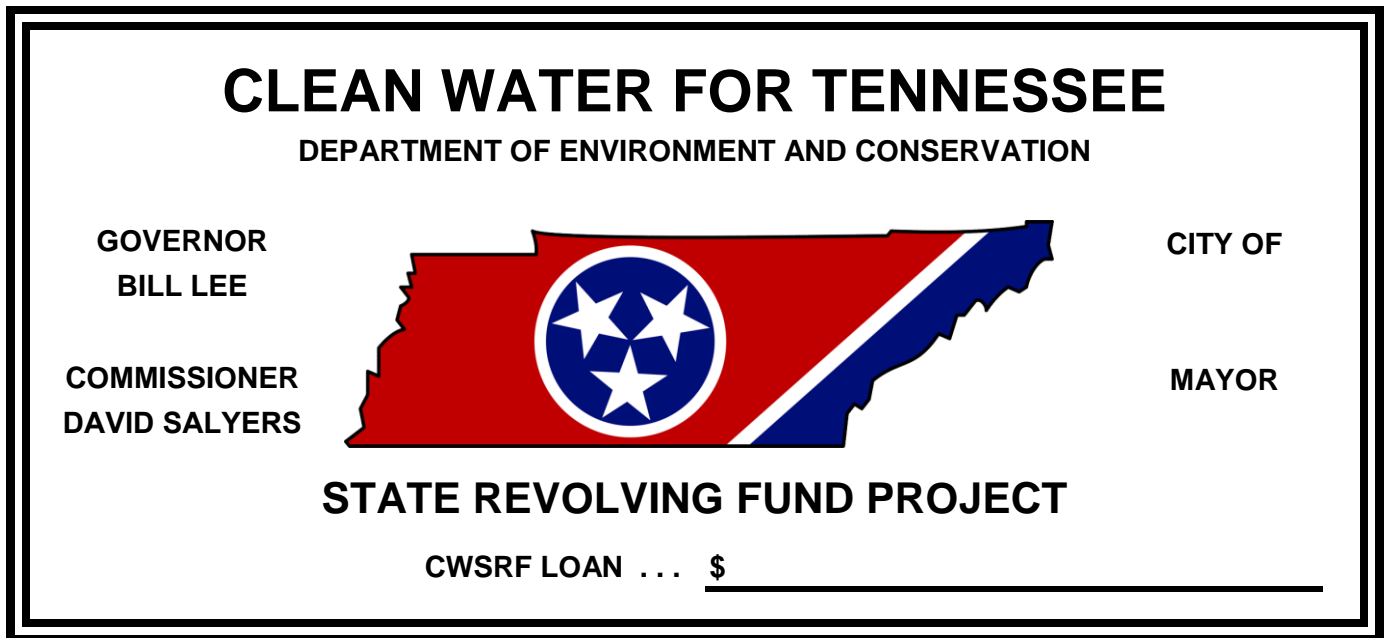
EFO	Street Address	Zip Code	EFO	Street Address	Zip Code
Memphis	8383 Wolf Lake Drive, Bartlett, TN	38133	Cookeville	1221 South Willow Ave.	38506
Jackson	1625 Hollywood Drive	38305	Chattanooga	540 McCallie Avenue STE 550	37402
Nashville	711 R S Gass Boulevard	37243	Knoxville	3711 Middlebrook Pike	37921
Columbia	1421 Hampshire Pike	38401	Johnson City	2305 Silverdale Road	37601

CLEAN WATER STATE REVOLVING FUND

IDENTIFICATION SIGN

All plans and specifications for each project approved shall contain provisions for requiring the general contractor to provide identification signs. The signs shall conform to the following basic features:

1. The following diagram shall be used as a design:



2. The sign shall be a 4'0" X 8'0" sheet of exterior grade plywood and shall be built so as to remain erected during the entire construction phase of the project.
3. The background of both sides shall be white. The lettering shall be black and shall be large enough to take advantage of the full size of the plywood. The stars shall be white set on a blue field and surrounded by a white ring placed inside a state map in red with a stripe of white and blue on the right side. The sign shall be bordered by a one-inch blue stripe.

Revised: MARCH 11, 2019

Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) finds that—

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

Project Coverage

1) What classes of projects are covered by the AIS requirement?

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

- 5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?**

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

- 6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?**

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

- 7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?**

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

- 8) What if a project has split funding from a non-SRF source?**

Many States intend to fund projects with "split" funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A "project" consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger

project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

9) What about refinancing?

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12)

Covered Iron and Steel Products

11) What is an iron or steel product?

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

- Lined or unlined pipes or fittings;
- Manhole Covers;
- Municipal Castings (defined in more detail below);
- Hydrants;
- Tanks;
- Flanges;
- Pipe clamps and restraints;
- Valves;
- Structural steel (defined in more detail below);
- Reinforced precast concrete; and
- Construction materials (defined in more detail below).

12) What does the term ‘primarily iron or steel’ mean?

‘Primarily iron or steel’ places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

15) What is the definition of steel?

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

16) What does ‘produced in the United States’ mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of 'municipal castings'?

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

- Access Hatches;
- Ballast Screen;
- Benches (Iron or Steel);
- Bollards;
- Cast Bases;
- Cast Iron Hinged Hatches, Square and Rectangular;
- Cast Iron Riser Rings;
- Catch Basin Inlet;
- Cleanout/Monument Boxes;
- Construction Covers and Frames;
- Curb and Corner Guards;
- Curb Openings;
- Detectable Warning Plates;
- Downspout Shoes (Boot, Inlet);
- Drainage Grates, Frames and Curb Inlets;
- Inlets;
- Junction Boxes;
- Lampposts;
- Manhole Covers, Rings and Frames, Risers;

Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates; and
Valve Boxes, Covers and Risers.

20) What is 'structural steel'?

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

21) What is a 'construction material' for purposes of the AIS requirement?

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

22) What is not considered a 'construction material' for purposes of the AIS requirement?

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and

data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

26) How should a State ensure assistance recipients are complying with the AIS requirement?

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-

888-546-8740 or OIG_Hotline@epa.gov. More information can be found at this website: <http://www.epa.gov/oig/hotline.htm>.

28) How do international trade agreements affect the implementation of the AIS requirements?

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step Waiver Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: cwsrfwaiver@epa.gov. For DWSRF waiver requests, please send the application to: dwsrfwaiver@epa.gov.

Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting – After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA's website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: http://water.epa.gov/grants_funding/aisrequirement.cfm
2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.
3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at dorfman.jordan@epa.gov or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Attachments

Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
<p>General</p> <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> — Description of the foreign and domestic construction materials — Unit of measure — Quantity — Price — Time of delivery or availability — Location of the construction project — Name and address of the proposed supplier — A detailed justification for the use of foreign construction materials • Waiver request was submitted according to the instructions in the memorandum • Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor 	✓	
<p>Cost Waiver Requests</p> <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers 		
<p>Availability Waiver Requests</p> <ul style="list-style-type: none"> • Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: <ul style="list-style-type: none"> — Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials — Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers. — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials • Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought • Has the State received other waiver requests for the materials described in this waiver request, for comparable projects? 		

Appendix 4: Sample Construction Contract Language

ALL CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN ALL CONTRACTS IN PROJECTS THAT USE SRF FUNDS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE OR LOCAL LAW:

The Contractor acknowledges to and for the benefit of the City of _____ (“Purchaser”) and the _____ (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel,” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Appendix 5: Sample Certifications

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

NOTICE

THIS ENTITY IS A RECIPIENT OF **STATE AND FEDERAL FUNDS**. IF YOU HAVE KNOWLEDGE OF ANY ACTIVITY WHICH YOU CONSIDER TO BE ILLEGAL, IMPROPER, OR WASTEFUL, PLEASE CALL THE STATE COMPTROLLER'S TOLL-FREE HOTLINE:

1-800-232-5454



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ARTICLE 1 – BID RECIPIENT

1.01 *This Bid is submitted to:*

***City of White House, Tennessee
Attn: Derek Watson, Purchasing Coordinator
105 College Street
White House, Tennessee 37188***

1.02 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.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 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.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

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

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has considered the information known to Bidder itself; 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 any 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; and (3) Bidder’s safety precautions and programs.

- E. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- F. 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.
- G. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- I. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER’S CERTIFICATION

4.01 Bidder certifies that:

- A. 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;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 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 non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 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, non-competitive levels; and
 - 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.

ARTICLE 5 – BASIS OF BID

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

WWTP IMPROVEMENTS

Item No.	Description	Est. Qty.	Unit	Bid Unit Price	Bid Total Price
1	Furnish, Install, and Place into Operation the wastewater treatment facility including all labor, materials and equipment shown on the Drawings and Specifications and not included in Items 2 through 9 below.	1	LS		\$
2	Soil Improvement System for structures identified on Drawings.	1	LS		\$
3	Operations Building	1	LS		\$
4	Alum Storage and Feed System including building, concrete, pumps, tanks, piping and all related appurtenances.	1	LS		\$
5	Erosion and Sediment Control	1	LS		\$
6	New Asphalt Access Road and Parking Areas	1,000	SY	\$	\$
7	Asphalt Overlay of Existing Access Road and Parking Areas	2,000	SY	\$	\$
8	Additional Concrete Sidewalk as required by Owner	100	SY	\$	\$
9	Equipment Allowances (proposals included)				
a	Process Bioreactor Equipment – Section 44 44 44 and related Sections				\$
b	Grit Removal Equipment – Section 44 42 41 and related Sections				\$
c	Effluent Filter System – Section 44 43 30 and related Sections				\$
d	Ultraviolet Disinfection System 44 44 17 and related Sections				\$
	Equipment Allowance TOTAL				\$2,500,000
10	Cash Allowances				
a	Soil and Concrete Testing				\$50,000.00

Item No.	Description	Est. Qty.	Unit	Bid Unit Price	Bid Total Price
b	Construction Verification Surveying as directed by Engineer				\$5,000.00
c	Special Inspection per Section 01 45 33				\$30,000.00
d	Utility Conflict/Equipment Relocation as directed by Engineer				\$75,000.00
Total of All Lump Sum Bid Items:					\$

Bid Data

The Bidder shall designate below the one manufacturer for each product to be furnished and installed if awarded the work. The Bidder understands that if this information is not provided, offering products meeting all specification requirements and having the approval of the Engineer, then the Owner reserves the right either to determine the Bidder non-responsive and reject the Bid or to designate the manufacturer of the products to be provided which will meet all specification requirements, which owner-designated manufacturer products must be furnished by the Bidder at no increase in the Contract Price.

Item No.	Product	Manufacturer / Supplier	Mark if Used in Base Bid	Bid Price
1	Secondary Clarifier - Section 44 42 24.01	Evoqua		
		Ovivo		
		WesTech		
2	Self-Priming Centrifugal Pump - Section 44 42 56.10	Wehr		
		Gorman Rupp		
3	System Integrator - Section 40 90 00 and related sections.	M/R Systems		
		Revere Controls		
		Southern Flow		

5.02 Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

5.03 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.

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) 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.

- 5.04 Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.
- 5.05 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.
- 5.06 Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) 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

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete within 520 calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 550 calendar days after the date when the Contract Times commence to run.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. List of Project References;
 - E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
 - F. Contractor's License No.: [or] Evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - G. Required Bidder Qualification Statement with supporting data; and
 - H. Drug-Free Workplace Affidavit
 - I. Non-Discrimination Policy
 - J. Statement of Compliance-Illegal Immigrants

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature] _____

[Printed name] _____

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number:

Fax Number:

Contact Name and e-mail address:

Bidder's License No.:

(where applicable)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.

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*):

City of White House
105 College Street
White House, Tennessee 37188

BID

Bid Due Date:
Description: Wastewater Treatment Plant Improvements

BOND

Bond Number:

Date:

Penal sum _____ \$ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

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 Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

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 of 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 the 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 the Bid due date.

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

Statement of Bidder's Qualifications

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information desired. Attach all additional sheets to this statement. (Sample "Project Information Form" contained at the end of this Section.)

- 1. Name of Bidder: _____
- 2. Permanent main office address and phone number: _____

- 3. When organized: _____
- 4. If a Corporation, where incorporated: _____
- 5. How many years have you been engaged in the contracting business under your present firm or trade name? _____
- 6. Contracts on hand. (Complete a "Project Information Form", for each Contract on hand.)
- 7. General description of type of work performed by your company: _____

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

- 9. Have you ever defaulted on a contract? If so, where and why? _____

- 10. Attach a list of the most important projects recently completed by your company which are similar in scope to this Project. (Complete a "Project Information Form", for each Project listed.)
- 11. Names, background and experience of the principal members of your organization, including officers:

Name	Position	Years Experience
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Statement of Bidder's Qualifications

12. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

I, _____, certify that I am _____ of the Bidder, and that the answers to the foregoing questions and statements contained therein are true and correct.

BIDDER: _____

By: _____

(name signed)

(name printed or typed)

Title: _____

Date: _____

Subscribed and sworn to me this ____ day of _____, 201__.

NOTARY PUBLIC: _____

(name signed)

(name printed or typed)

Commission Expires: _____

(Date)

(SEAL)

Project Information Form

Project Title: _____

Project Description: _____

Project Owner:

- Owner Name: _____
- Contact Person: _____
- Phone Number: _____

Engineer/Construction Manager:

- Company Name: _____
- Contact Person: _____
- Phone Number: _____

Contract Amount:

- Initial: _____
- Final: _____

Contract Time

- Initial: _____
- Final: _____
- Completion Date: _____

END OF SECTION

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Non-Collusion Affidavit of Prime Bidder

STATE OF _____ COUNTY OF _____

I, _____, being first duly sworn, deposes and says that:

He or she is _____
(Owner, Partner, Officer, Representative or Agent)

of _____, the Bidder that has submitted the attached Bid;

He or she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this Affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against Paris Board of Public Utilities or any person interested in the proposed Contract; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this Affiant.

BIDDER: _____

By: _____
(name signed)

(name printed or typed)

Title: _____

Date: _____

Subscribed and sworn to me this ____ day of _____, 201 ____.

NOTARY PUBLIC: _____
(name signed)

(name printed or typed)

Commission Expires: _____

(SEAL)

END OF SECTION

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Section 00 45 53
Corporate Certificate

I, _____, certify that I am the Secretary of the Corporation named as Bidder in the foregoing Bid; that _____, who signed said Bid on behalf of the Contractor was then _____ of said Corporation; that said Bid was duly signed for and on behalf of said Corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said Corporation is organized under the laws of the State of _____.

This ____ day of _____, 201____.

Corporate
Secretary:

(name signed)

(name printed or typed)

(SEAL)

END OF SECTION

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By signature on this certificate, the Contractor certifies that:

_____ It has a drug-free workplace program that complies with Tennessee Code Title 50 Chapter 9 – Drug-Free Workplace Programs which was in effect at the time of submission of this Bid, at least to the extent required of governmental entities.

_____ It has less than five employees receiving pay.

(Please indicate which one, or both, that are correct.)

Pursuant to Tennessee Code Annotated Section 50-9-114, by signature on this affidavit, the Contractor attests that it operates a drug-free workplace program, or other drug or alcohol testing program with requirements at least as stringent as that of the program operated by the Owner.

BIDDER: _____

By: _____

(name signed)

(name printed or typed)

Title: _____

Date: _____

END OF SECTION

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Attestation Regarding Personnel Used in Contract Performance

Project Name: _____

The Bidder/Contractor, identified below, does hereby attest, certify, warrant, and assure that the Contractor shall not knowingly utilize the services of an illegal immigrant in the performance of this Contract and shall not knowingly utilize the services of any subcontractor who will utilize the services of an illegal immigrant in the performance of this Contract.

BIDDER/CONTRACTOR: _____

By: _____

(name signed)

(name printed or typed)

Title: _____

Date: _____

NOTICE: This attestation MUST be signed by an individual empowered to contractually bind the Contractor. If said individual is not the chief executive or president, this document shall attach evidence showing the individual's authority to contractually bind the Contractor.

END OF SECTION

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Contractor's License Certification

Bidder

Contractor's Name: _____

License Number: _____

License Classification: _____

Expiration Date of License: _____

Electrical Subcontractor (Same As On Outside Of Envelope)

Contractor's Name: _____

License Number: _____

License Classification: _____

Expiration Date of License: _____

Plumbing Subcontractor (Same As On Outside Of Envelope)

Contractor's Name: _____

License Number: _____

License Classification: _____

Expiration Date of License: _____

Heating, Ventilation and Air Conditioning Subcontractor (Same As On Outside Of Envelope)

Contractor's Name: _____

License Number: _____

License Classification: _____

Expiration Date of License: _____

Masonry Subcontractor (Same As On Outside Of Envelope)

Contractor's Name: _____

License Number: _____

License Classification: _____

Expiration Date of License: _____

Contractor's License Certification

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

BIDDER: _____

By: _____

(name signed)

(name printed or typed)

Title: _____

Date: _____

END OF SECTION

NON-COLLUSION AFFIDAVIT

State of _____,
County of _____

_____, being first duly sworn, deposes and says that:

- (1) He/She is the _____ of _____, the firm that has submitted the attached Proposal;
- (2) He/She is fully informed respecting the preparation and contents of the attached Proposal and of all pertinent circumstances respecting such Proposal;
- (3) Such Proposal is genuine and is not a collusive or sham Proposal;
- (4) Neither the said firm nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly, with any other vendor, firm or person to submit collusive or sham proposal in connection with the contract or agreement for which the attached Proposal has been submitted or to refrain from making a proposal in connection with such contract or agreement, or collusion or communication or conference with any other firm, or, to fix any overhead, profit, or cost element of the proposal price or the proposal price of any other firm, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against the Town of Farragut or any person interested in the proposed contract or agreement; and
- (5) The proposal of service outlined in the Proposal is fair and proper and is not tainted by collusion, conspiracy, connivance, or unlawful agreement on the part of the firm or any of its agents, representatives, owners, employees, or parties including this affiant.

(Signed): _____

Title: _____

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

Title

My commission expires: _____

STATEMENT OF COMPLIANCE CERTIFICATE ILLEGAL IMMIGRANTS

EACH CONTRACTOR BIDDING SHALL FILL IN AND SIGN THE FOLLOWING

This is to certify that _____ have fully complied with all the requirements of Tennessee Code Annotated § 12-4-124.

- All Bidders for construction services on this project shall be required to submit an affidavit (by executing this compliance document) as part of their bid that attests that such Bidder shall comply with requirements T.C.A. § 12-4-124.

Signed:

State of _____,
County of _____

Personally appeared before me, _____ the undersigned Notary Public, _____, the within named bargainer, with whom I am personally acquainted, and known to me to be the President / Owner / Partner (as applicable) of the _____, Corporation, Partnership, Sole Proprietorship (as applicable) and acknowledged to me that he executed the foregoing document for the purposes recited therein.

Witness my hand, at office, this _____ day of _____, 20_____.

Notary Public

My commission expires: _____

NOTICE OF AWARD

Date of Issuance:

Owner:	City of White House, TN	Owner's Contract No.:	
Engineer:	Jacobs Engineering Group	Engineer's Project No.:	
Project:	Wastewater Treatment Plant Improvements	Contract Name:	Wastewater Treatment Plant Improvements

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [_____] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is: \$ _____ *[note if subject to unit prices, or cost-plus]*

unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of this Notice of Award:

1. Deliver to Owner [____] counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

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

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner:

Authorized Signature

By:

Title:

Copy: File

**AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (UNIT PRICE)**

THIS AGREEMENT is by and between City of White House (“Owner”) and _____ (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

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

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Wastewater Treatment Plant Improvements

ARTICLE 3 – ENGINEER

- 3.01 The part of the Project that pertains to the Work has been designed by the City of White House.
- 3.02 The Owner has retained Jacobs Engineering Group (“Engineer”) to act as Owner’s representative, assume all 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.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Dates*

- A. The Work will be substantially completed within 520 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 550 days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. 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):

1. Substantial Completion: Contractor shall pay Owner \$700.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$400.00 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 5 – CONTRACT PRICE

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

- A. For all Work, at the prices stated in the Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 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 Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. 95 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, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the maximum legal rate.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has considered the information known to Contractor itself; 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 the 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; and (3) Contractor's safety precautions and programs.
 - E. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no 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.
 - F. 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.
 - G. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - H. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

- I. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to █, inclusive).
2. Performance bond (pages █ to █, inclusive).
3. Payment bond (pages █ to █, inclusive).
4. Other bonds.
 - a. █ (pages █ to █, inclusive).

NOTE(S) TO USER:

Such other bonds might include maintenance or warranty bonds intended to manage risk after completion of the Work.

5. General Conditions (pages █ to █, inclusive).
 6. Supplementary Conditions (pages █ to █, inclusive).
 7. Specifications as listed in the table of contents of the Project Manual.
 8. Drawings (not attached but incorporated by reference) consisting of █ sheets with each sheet bearing the following general title: █ [or] the Drawings listed on the attached sheet index.
 9. Addenda (numbers █ to █, inclusive).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages █ to █, inclusive).
 11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
 - C. There are no Contract Documents other than those listed above in this Article 9.
 - D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Contractor's Certifications*

- A. 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 10.05:
 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 the Contract execution;
 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 prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 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, non-competitive levels; and
 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.

10.06 *Other Provisions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or “track changes” (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

City of White House _____

By: _____

By: _____

Title: _____

Title: _____

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

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

License No.: _____
(where applicable)

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.

NOTICE TO PROCEED

Owner:	City of White House	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:		Engineer's Project No.:	
Project:	Wastewater Treatment Plant Improvements	Contract Name:	Wastewater Treatment Plant Improvements
		Effective Date of Contract:	

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [_____, 20__]. [see Paragraph 4.01 of the General Conditions]

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, [the date of Substantial Completion is _____, and the date of readiness for final payment is _____] **or** [the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before starting any Work at the Site, Contractor must comply with the following:
[Note any access limitations, security procedures, or other restrictions]

Owner: _____

By: _____
 Authorized Signature

Title: _____

Date Issued: _____

Copy: Engineer

PERFORMANCE BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

City of White House, TN
 105 College Street
 White House, Tennessee 37188

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

 Contractor's Name and Corporate Seal *(seal)*

 Surety's Name and Corporate Seal *(seal)*

By: _____
 Signature

By: _____
 Signature *(attach power of attorney)*

 Print Name

 Print Name

 Title

 Title

Attest: _____
 Signature

Attest: _____
 Signature

 Title

 Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

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

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

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

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

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

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

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

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence,

to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

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

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

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

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

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

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

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

11. 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 a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims

for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

City of White House, TN
105 College Street
White House, Tennessee 37188

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

_____ *(seal)*

Contractor's Name and Corporate Seal

_____ *(seal)*

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, 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.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. **Definitions**
 - 16.1 **Claim:** A written statement by the Claimant including at a minimum:
 1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 4. A brief description of the labor, materials, or equipment furnished;
 5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
 - 16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
 - 16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
 - 16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.



Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner): City of White House, TN	From (Contractor):	Via (Engineer):
Project: Wastewater Treatment Plant Improvements	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

**Application For Payment
Change Order Summary**

Approved Change Orders	Number	Additions	Deductions	
				1. ORIGINAL CONTRACT PRICE \$ _____
				2. Net change by Change Orders \$ _____
				3. Current Contract Price (Line 1 ± 2) \$ _____
				4. TOTAL COMPLETED AND STORED TO DATE (Column F total on Progress Estimates)..... \$ _____
				5. RETAINAGE:
				a. X _____ Work Completed..... \$ _____
				b. X _____ Stored Material..... \$ _____
				c. Total Retainage (Line 5.a + Line 5.b)..... \$ _____
				6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c) \$ _____
				7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application) \$ _____
				8. AMOUNT DUE THIS APPLICATION \$ _____
				9. BALANCE TO FINISH, PLUS RETAINAGE (Column G total on Progress Estimates + Line 5.c above)..... \$ _____
TOTALS				
	NET CHANGE BY CHANGE ORDERS			

Contractor's Certification	
The undersigned Contractor certifies, to the best of its knowledge, the following: (1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment; (2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and (3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.	
Contractor Signature	
By: _____	Date: _____

Payment of:	\$ _____	(Line 8 or other - attach explanation of the other amount)
is recommended by:	_____	_____ (Date)
	(Engineer)	
Payment of:	\$ _____	(Line 8 or other - attach explanation of the other amount)
is approved by:	_____	_____ (Date)
	(Owner)	
Approved by:	_____	_____ (Date)
	Funding or Financing Entity (if applicable)	

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: City of White House	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project: Wastewater Treatment Plant Improvements	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: None
 As follows

Amendments to Contractor's responsibilities: None
 As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____



License Agreement

Before you use this EJCDC document:

1. **Read this License Agreement in its entirety.** As purchaser, you agree to comply with and are bound by the License Agreement's terms, conditions, and instructions when you use the attached EJCDC document. **Commencement of use of the attached document indicates your acceptance of these terms, conditions, and instructions.** If you do not agree to them, you should promptly return the materials to the vendor.
2. **This License Agreement applies to the attached document only. Other licensing terms and instructions may apply to other EJCDC documents.**
3. The Engineers Joint Contract Documents Committee ("EJCDC") provides **EJCDC Design and Construction Related Documents (including but not limited to the EJCDC document that is attached, and all other documents in the EJCDC Construction Series, Engineering Series, Design-Build Series, Remediation Series, Procurement Series, and Narrative Series)** and licenses their use worldwide. You assume sole responsibility for the selection of specific documents or portions thereof to achieve your intended results, and for the installation, use, and results obtained from **EJCDC Design and Construction Related Documents**.
4. You acknowledge that you understand that the text of the **EJCDC Design and Construction Related Documents** has important legal consequences and that consultation with an attorney is recommended with respect to use or modification of the text. You further acknowledge that EJCDC documents are protected by the copyright laws of the United States.
5. Make sure that you have the correct word processing software for the attached EJCDC document, which is distributed in Microsoft Word (.doc) format.
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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. 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, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 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. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice 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.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *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.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *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.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *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, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *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.
40. *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.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *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 a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *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 but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs 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 Article 10 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 15.03 or 15.04).
- 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. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- 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. *Bonds*: 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 Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), 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;
 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.

2.04 *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 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, 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 and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *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 2.03.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 the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, 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.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, 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, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract 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, reference standard, 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 part of the Contract Documents prepared by or for Engineer. 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 part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or 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) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) 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 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
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 part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); 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 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers 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 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; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- 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.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *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 Contract 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 Contract. 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 Contract, whichever date is earlier.

4.02 *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 such date.

4.03 *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.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 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 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. 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, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, 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 Times and Contract Price. 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.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. 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. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *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.
- 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 permanent improvements are to be made 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.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, 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 any such claim, and against all 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 directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent 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 and adjacent areas 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 of 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 structures or land to stresses or pressures that will endanger them.

5.03 *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 adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on 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.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site 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 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; 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;

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 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, 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 fall within any one or more of the categories described in Paragraph 5.04.A;
 - 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 Paragraph 13.03; and,

- c. 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.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a 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 otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent 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 do not warrant or guarantee 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 information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then 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 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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 Paragraph 13.03;
 - c. 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; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on 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 removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) 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 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. 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, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. 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, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. 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 (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. 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 failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, 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. 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 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond 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 the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then 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 bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. 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.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against 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. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; 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 (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that 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.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, 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.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable 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 Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 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; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; 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. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, 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 insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the 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 Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, 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 or Contractor as trustee or fiduciary, 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 occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.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, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, 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 builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 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.
- 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.

7.02 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, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 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, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work 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.

7.04 "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 Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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 is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that 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, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, 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;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - 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.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. 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:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) 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
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. 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.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. 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 the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. 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.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. 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.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. 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 the particular Subcontractor or Supplier.

- O. 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 money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, 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 the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *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.

7.10 *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 or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and 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 such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

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

7.12 *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, other work in progress, 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 Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - 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 7.12.A.2 or 7.12.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 at its expense (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 protection 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 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *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.

7.14 *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.

7.15 *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.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the 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 and equipment 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 of that submittal, and that Contractor approves the 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 set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- 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 7.16.D.

2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall 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 7.16.D.
3. 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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- 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 or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample 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 7.16.A.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 will document any such approved variation from the requirements of the Contract Documents in a Field Order.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

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.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *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 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;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, 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 7.18.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 7.18.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.

7.19 *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 Laws and Regulations.
- 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, 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, 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 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. 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.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) 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 any such claims, and against all 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 damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *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.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *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 (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- 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.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *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.

10.02 *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 10.08. 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.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. 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.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. 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, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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 15.06.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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes 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. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. 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, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, 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 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.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 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - 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 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. 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;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work 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 13.01.C, 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, and 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 13.01.
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 6.05), 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 communication 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 that Contractor is required by the Contract Documents to purchase and maintain.

C. *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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here 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 Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole 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, Change Proposal, Claim, set-off, or other 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 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, 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.

13.02 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*: Contractor agrees that:
 - 1. 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
 - 2. 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*: 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.

13.03 *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. Payments to Contractor for Unit Price Work will be based on actual quantities.
- 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. 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 the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price 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;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it 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 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction 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.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- 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, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. 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. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages 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. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then 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, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages 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 pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. 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, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *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, then 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.

14.07 *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, 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, then 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 14.07, 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, 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 incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. 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 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 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 during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *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, a warehouse bond, 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.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, 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 13.03, 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; 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 money 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 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. 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;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, 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, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

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 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *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 and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- 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 preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. 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 punch list.

15.04 *Partial Use or Occupancy*

- 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. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be 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 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work 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 15.03 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 6.05 regarding builder's risk or other property insurance.

15.05 *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, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *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, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) 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, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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 have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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 15.07. 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. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *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 Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 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 to 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. 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 repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- 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, 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 are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *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 written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and 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);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, 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 complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.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 the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds 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.

- F. 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, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *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; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) 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 16.03.
- 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 are not intended to preclude Contractor from submitting a Change Proposal 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 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *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, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract 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.

18.03 *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. 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.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

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

18.08 *Headings*

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

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Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). 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.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

SC-101. Add the following language at the end of the last sentence of Paragraph 1.01.A.8:

The Change Order form to be used on this Project is EJCDC C-941. Agency approval is required before Change Orders are effective.

Add the following language at the end of the last sentence of Paragraph 1.01.A.48:

The Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

Add the following new Paragraph after Paragraph 1.01.A.48:

A.49 *Abnormal Weather Conditions*—Conditions of extreme or unusual weather for a given region, elevation or season as determined by Engineer. Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered Abnormal Weather Conditions.

SC-1.01. Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

Geotechnical Baseline Report (GBR) — The interpretive report prepared by or for Owner regarding subsurface conditions at the Site, and containing specific baseline geotechnical conditions that may be anticipated or relied upon for bidding and contract administration purposes, subject to the controlling provisions of the Contract, including the GBR's own terms. The GBR is a Contract Document.

Geotechnical Data Report (GDR) — The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner in support of the Geotechnical Baseline Report. The GDR's content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative non-factual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not operative parts

of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

SC-2.01 Delete Paragraphs 2.01 B. and C. in their entirety and insert the following in their place:

- B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. Evidence of Owner's Insurance: After receipt from Contractor of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner under Article 6 (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.02 Copies of Documents

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- A. Owner shall furnish to Contractor [3] copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01. Commencement of Contract Times; Notice to Proceed

- A. **Amend the last sentence of Paragraph 4.01A by striking out the following works:**

The Contract Times will commence to run on the days 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.

SC-4.05 Delays in Contractor's Progress

- C.2 **Amend Paragraph 4.05.C.2 by striking out the following text: "abnormal weather conditions;" and inserting the following text:**

Abnormal Weather Conditions as defined in 4.05.H.

Add the following new Paragraphs immediately after Paragraph 4.05.G:

- H. If a claim is made as provided in Article 12 for delay due to abnormal weather conditions, the time extension to be awarded to Contractor, if any, shall be calculated using the following standard baseline (Standard Baseline") of monthly anticipated adverse weather delay days for the project location. Extensions shall only be granted for days lost in any given month in excess of the number

of days shown in the Standard Baseline for the same given month. The Standard Baseline shall be regarded as the established normal and anticipatable number of calendar days for each month during which construction activity shall be expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline shall be included in the Contractor’s scheduling of weather-dependent activities and shall not be eligible for extension of Contract Time.

Standard Baseline – Monthly Contract Allowance (MCA) in days												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days	8	6	6	7	5	8	7	5	6	3	5	7

1. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevents exterior construction activity or access to the site within twenty-four (24) hours:
 - a. Precipitation (rain, snow, and/or ice) in excess of two-tenths inch (0.20”) liquid measure.
 - b. Sanding Snow in excess of one inch (1”)
2. Adverse Weather may include, as deemed by Engineer, “dry-out” or “mud” days:
 - a. For rain days above the Standard Baseline,
 - b. Only if there is a hindrance to site access or site work such as earthwork; and,
 - c. At a rate no greater than one (1) make-up day for each day or consecutive days of rain beyond the Standard Baseline that specifically recommended otherwise by Engineer.
3. Actual adverse weather delay days must prevent work on critical exterior activities for fifty percent (50%) or more of Contractor’s scheduled workday. The number of actual adverse weather delay days shall be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather days exceeds the number of days anticipated by the Standard Baseline, and providing that all other contractually-required conditions are met, qualifying delays will be added to the Contract times for each qualifying delay in excess of Standard Baseline.
4. Upon commencement of on-site activities and continuing throughout construction, Contractor shall be responsible for accurately measuring and recording the daily occurrence of adverse weather on-site.
5. Within 30 days of the last day of any month (hereinafter referred to as the “Reporting Month”), Contractor shall submit a written Adverse Weather Report, including copies of Contractor’s daily weather reports and applicable climatological data from the National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location, unless Engineer allows an additional period of time for submission of said report. Notwithstanding any other provisions, failure to submit the required written report within the time specified above shall be deemed to be and shall constitute a waiver by Contractor of any occurring during said Reporting Month.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Subsurface and Physical Conditions

SC/GBR-5.03 and 5.04. Delete Paragraphs 5.03 and 5.04 of the General Conditions in their entireties and replace with the following provisions:

SC/GBR-5.03 Subsurface and Physical Conditions

A. Reports and Drawings: The Supplementary Conditions hereby identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site (other than any Geotechnical Data Report or Geotechnical Baseline Report), and Technical Data contained in such reports. Such reports are as follows:

a. None

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), and Technical Data contained in such drawings. Such drawings are as follows:

a. None

B. 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. Except for such reliance on 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. Geotechnical Baseline Report:

1. This Contract contains a Geotechnical Baseline Report ("GBR"), identified as follows: *Report of Geotechnical Exploration Services for Wastewater Treatment Plant Expansion, dated October, 2018, by TTL, Nashville, Tennessee.*

This Contract does not contain a Geotechnical Data Report (GDR).

2. The GBR and GDR are incorporated as Contract Documents. The GBR and GDR are to be used in conjunction with other Contract Documents, including the Drawings and Specifications. If there is a conflict between the terms of the GBR and the GDR, the GBR's terms shall prevail.

3. The GBR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations (referred to here in the Supplementary Conditions as “Baseline Conditions”). These may include ground, geological, groundwater, and other subsurface geotechnical conditions, and baselines of anticipated Underground Facilities or subsurface structures.
4. The Baseline Conditions shall be used to assist in the administration of the Contract’s differing site conditions clause at locations where subsurface conditions have been baselined. If a condition is baselined in the GBR, then only the pertinent Baseline Conditions shall be used to determine whether there is a differing site condition; and no other indication of that condition in the Contract Documents or Technical Data, or of a condition that describes, quantifies, or measures a similar characteristic of the subsurface, shall be used for the differing site condition determination.
5. The Baseline Conditions shall not be used to make differing site conditions determinations at locations that have not been baselined in the GBR, or at any location with respect to subsurface conditions that the Baseline Conditions do not address. If Underground Facilities or Hazardous Environmental Conditions are expressly addressed in the Baseline Conditions, then comparison to such Baseline Conditions shall be the primary means of determining (a) whether an Underground Facility was shown or indicated with reasonable accuracy, as provided in Paragraph 5.05 of the General Conditions, or (b) whether a Hazardous Environmental Condition was shown or indicated in the Contract Documents as indicated in Paragraph 5.06.H of the General Conditions. As indicated in Paragraph SC-5.04 below, the GDR shall be the primary resource for differing site conditions determinations in cases in which the GBR is inapplicable.
6. The descriptions of subsurface conditions provided in the GBR are based on geotechnical investigations, laboratory tests, interpretation, interpolation, extrapolation, and analyses. Neither Owner, Engineer, nor any geotechnical or other consultant warrants or guarantees that actual subsurface conditions will be as described in the GBR, nor is the GBR intended to warrant or guarantee the use of specific means or methods of construction.
7. The behavior of the ground during construction depends substantially upon the Contractor’s selected means, methods, techniques, sequences, and procedures of construction. If ground behavior conditions are baselined in the GBR, they are based on stated assumptions regarding construction means and methods.
8. The GBR shall not reduce or relieve Contractor of its responsibility for the planning, selection, and implementation of safety precautions and programs incident to Contractor’s means, methods, techniques, sequences, and procedures of construction, or to the Work.

SC/GBR-5.04 Differing Subsurface or Physical Conditions

- A. Notice: If Contractor believes that any subsurface condition that is uncovered or revealed at the Site:
1. differs materially from conditions shown or indicated in the GBR; or
 2. differs materially from conditions shown or indicated in the GDR, to the extent the GBR is inapplicable; or
 3. differs materially from conditions shown or indicated in Contract Documents other than the GBR or GDR, to the extent the GBR and GDR are inapplicable; or
 4. to the extent the GBR and GDR are inapplicable, is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 5. to the extent the GBR and GDR are inapplicable, is of such a nature as to require a change in the Drawings or Specifications; or
 6. to the extent the GBR and GDR are inapplicable, 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;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. Engineer's Review: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph SC/GBR 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption or continuation of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

- C. Owner's Statement to Contractor Regarding Site Condition:

After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption or continuation of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. Possible Price and Times Adjustments:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, 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 fall within any one or more of the categories described in Paragraph SC/GBR 5.04.A;
 - 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 Paragraph 13.03 of the General Conditions; and,
 - c. 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.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a 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 otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph SC/GBR 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.02 Insurance—General Provisions

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

1. Contractor may obtain worker’s compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker’s compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months.
2. Satisfactory certificates of insurance shall be file with the Owner prior to starting any construction work on this contract. The Owner will be named as an additional insured on all policies of insurance and all certificates shall contain a 60-day Notice of Cancellation. In connection with the provisions set forth in the General Conditions, the Notice to Proceed will not be issued until satisfactory certificates of insurance are filed.

SC-6.03 Contractor’s Insurance

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers’ Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	<u>Statutory</u>
Federal, if applicable (e.g., Longshoreman’s):	<u>Statutory</u>

Employer’s Liability:

Bodily injury, each accident	\$ <u>1,000,000</u>
Bodily injury by disease, each employee	\$ <u>1,000,000</u>
Bodily injury/disease aggregate	\$ <u>1,000,000</u>

2. Contractor’s Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	\$ <u>2,000,000</u>
Products - Completed Operations Aggregate	\$ <u>2,000,000</u>
Personal and Advertising Injury	\$ <u>2,000,000</u>
Each Occurrence (Bodily Injury and Property Damage)	\$ <u>2,000,000</u>

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person	\$ <u>1,000,000</u>
Each accident	\$ <u>1,000,000</u>

Property Damage:

Each accident	\$ <u>1,000,000</u>
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4. Excess or Umbrella Liability:

Per Occurrence	\$ <u>5,000,000</u>
General Aggregate	\$ <u>5,000,000</u>

5. Contractor's Pollution Liability:

Each Occurrence	\$ <u>1,000,000</u>
General Aggregate	\$ <u>1,000,000</u>

If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

SC-6.05 Property Insurance

SC-6.05.A. Delete Paragraph 6.05.A of the General Conditions and substitute the following in its place:

- A. Contractor shall provide 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:
1. Include the interests of Owner, Contractor, Subcontractors, Engineer, and the officers, directors, 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;
 2. Be written on a Builder's Risk "all-risk" policy form that shall at least included insurance for physical loss and 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 these 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. Included testing and startup;
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 certificated of insurance has been issued; and
8. Comply with the requirements of Paragraph 5.06.C if the General Conditions.

ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES

SC-7.02 Labor; Working Hours

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Regular working hours will be 7:00 a.m. – 5:00 p.m. Monday - Thursday.
2. Owner's legal holidays are *New Year’s Day, Martin Luther King, Jr. Day, President’s Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas Eve, Christmas Day.*

SC-7.02.C. Add the following new paragraph immediately after Paragraph 7.02.B:

Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer’s services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

If Contractor works more than 40 hours per week, Contractor shall reimburse Owner for the costs of overtime inspection. Engineer and Owner shall solely determine if overtime inspection is required. Owner will deduct the costs for overtime inspection hours from Contractor’s applications for progress payment.

SC-7.03.C Add the following new paragraphs immediately after Paragraph 7303.C of the General Conditions

- D. Until final completion of the Work is acknowledged by Owner, Contractor shall have responsible charge and care of the Work and of all equipment and materials to be used therein, including equipment or materials which have been furnished by Owner, and shall bear the risk of injury, loss, or damage to any part thereof by action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work
- E. Contractor shall rebuild, repair, restore, and make good all injuries, losses, or damages to any portion of the Work or the equipment or materials occasioned by any cause before completion and acceptance of the Work and shall bear the expense therefore. Contractor shall, at no additional cost to Owner, provide suitable drainage and suitable structures as necessary to protect the Work or any portion thereof from damage

- F. Suspension of the Work or the granting of an extension of time for any cause whatever shall not relieve Contractor of his responsibilities for the Work as specified herein.

SC-7.04 "Or Equals"

SC-7.04.A Amend the third sentence of Paragraph 7.04.A by striking out the following works:

Unless the specification or description contains or is followed by works reading that no like, equivalent, or "or-equal" item is permitted.

SC-7.06 Concerning Subcontractors, Suppliers, and Others

SC-7.06.A Amend Paragraph 7.06.A by adding the following text to the end of the Paragraph:

The Contractor shall not award work valued at more than fifty percent (50%) of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-7.09 Taxes

SC-7.09 Add a new paragraph immediately after Paragraph 7.09.A:

A.

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Tennessee and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.

4. Liaison:
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, 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 work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. 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.

13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents 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 delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

B.

- C. The RPR shall not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).
 2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s work.
 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
 8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

SC-11.07 Execution of Change Orders

SC-11.07 Add the following new Paragraph immediately after Paragraph 11.07.B:

- C. All Contract Change Orders must be concurred in by Agency before they are effective.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.01 Cost of the Work

SC 13.01.B.5.c Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

- c. Construction Equipment and Machinery:
- 1) Rentals of all 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. 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.
 - 2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the [*cite the rate book appropriate for the Project*]. 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 any 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-13.03 Unit Price Work

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

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
1. if the extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 10 percent from the estimated quantity of such item indicated in the Agreement; and
 2. if there is no corresponding adjustment with respect to any other item of Work; and
 3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

SC-15.01.B Applications for Payment

SC-15.01.B.3 Add the following language at the end of Paragraph 15.01.B.3:

No Payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

SC-15.01.B Add the following new paragraph immediately after Paragraph 15.01.B.3:

4. The Application for Payment form to be used on this Project is EJCDC C-620. The Agency must approve all Applications for Payment before payment is made.

SC-15.01.D Payment Becomes Due

SC-15.01.D.1 Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place:

The Application for Payment with Engineer's recommendation will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due twenty (20) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-15.02 *Contractor's Warranty of Title*

SC-15.02.A **Amend Paragraph 15.02.A by striking out the following text: "no later than seven days after the time of payment by Owner" and insert "no later than the time of payment by Owner."**

SC-15.03 *Substantial Completion*

SC 15.03.B **Add the following new subparagraph to Paragraph 15.03.B:**

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

SC-17.02 Arbitration

- A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the rules of *[insert name of selected arbitration agency]*, subject to the conditions and limitations of this paragraph. 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.
- 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 specific time required in this Article, or if no specified time is applicable within a reasonable time after the 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 matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.
- C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 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
 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.
- D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.
- 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 Laws and Regulations relating to vacating or modifying an arbitral award.

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

SC-17.03 Attorneys' Fees

SC-17.03 Attorneys' Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

Work Change Directive No.

Date of Issuance: _____ Effective Date: _____
 Owner: _____ Owner's Contract No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Project: **WWTP Improvements** Contract Name: _____

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price \$ _____ [increase] [decrease].
 Contract Time _____ days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum Unit Price
- Cost of the Work Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
 Title: _____

Date of Issuance:	Effective Date:
Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Jacobs Engineering Group	Engineer's Project No.:
Project: Wastewater Treatment Plant Improvements	Contract Name:

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (if required)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
Title: _____

Date of Issuance: _____ Effective Date: _____
Owner: _____ Owner's Contract No.: _____
Contractor: _____ Contractor's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Project: WWTP Improvements Contract Name: _____

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____
Specification(s) _____ Drawing(s) / Detail(s) _____

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

**TECHNICAL
SPECIFICATIONS**

**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The completed Work will provide the Owner with a fully functional operational, expanded and upgraded 2 MGD wastewater treatment facility.
- B. The Work will consist of construction of new systems, and reuse of existing systems including civil, electrical, instrumentation and control, structural, architectural and HVAC works for a complete operating plant.
 - 1. New Systems:
 - a. Grit Removal Facility with grit pump and classifier.
 - b. Bioreactor System, two trains with mixers, mechanical aerators, and aeration diffusers.
 - c. Two reaeration blowers with canopy.
 - d. One new clarifier with integral scum pit and pump.
 - e. Three RAS pumps and three WAS pumps.
 - f. Two effluent filters.
 - g. Alum storage tank and metering pump skid.
 - h. One UV disinfection system with Parshall flume.
 - i. Two reclaimed water distribution pumps.
 - 2. Civil works as documented in the documents including but not limited to access road and associated drainage structure and outfall line to the creek.
 - 3. Architectural and HVAC work including the operations building, electrical building, and miscellaneous changes to the RAS/WAS building.

1.02 OWNER-FURNISHED PRODUCTS

- A. Refer to Section 01 64 00, Owner-Furnished Products.

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 forms:
 - a. Submit with initially acceptable Schedule of Values.
 - b. Submit adjustments thereto with Application for Payment.
 - 2. Application for Payment.
 - 3. Final Application for Payment.

1.02 CASH ALLOWANCES

- A. Consult with Engineer in selection of products or services. Obtain proposals from Suppliers and offer recommendations.
- B. Cash allowances will be administered in accordance with Paragraph 13.02 of General Conditions.
- C. Submit, with application for payment, invoice showing date of purchase, from whom the purchase was made, the date of delivery of the product or service, and the price, including delivery to the Site and applicable taxes.
- D. Cash allowances are further described as: Soil and Concrete Testing.

1.03 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:
 - 1. Reflect specified allowances and alternates, as applicable.
 - 2. List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.

3. Break down by Division 02 through 49.

- 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.
- G. Submit Schedule of Values on a CD in a spreadsheet format compatible with latest version of MS Excel.

1.04 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.

1.05 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule 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 (EJCDC C-620) provided herein.
- 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.

1.06 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, weigh material on scales furnished by Contractor and certified accurate by state agency responsible. Obtain weight or load slip from weigher and deliver to Owner’s representative at point of delivery of material.
- C. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.
- D. Haul materials that are specified for measurement by the cubic yard measured in the vehicle in transport vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Load vehicles to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- E. Quantities Based on Profile Elevations: Existing ground profiles shown on Drawings were taken from a topographic map drawn with contour intervals of 1 feet.
- F. Quantities will be based on ground profiles shown. Field surveys will not be made to confirm accuracy of elevations shown.
- G. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure by Engineer
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale

Item	Method of Measurement
LF	Linear Foot—Field Measure by Engineer
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

1.07 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.

1.08 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.

1.09 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.

1.10 PARTIAL PAYMENT FOR UNDELIVERED, PROJECT-SPECIFIC
MANUFACTURED OR FABRICATED EQUIPMENT

- A. Notwithstanding above provisions, partial payments for undelivered (not yet delivered to Site or not stored in the vicinity of Site) products specifically manufactured for this Project, excluding off the shelf or catalog items, will be made for products listed below when all following conditions exist:
 - 1. Partial payment request is supported by written acknowledgment from Suppliers that invoice requirements have been met.
 - 2. Equipment is adequately insured, maintained, stored, and protected by appropriate security measures.
 - 3. Each equipment item is clearly marked and segregated from other items to permit inventory and accountability.
 - 4. Authorization has been provided for access to storage Site for Engineer and Owner.
 - 5. Equipment meets applicable Specifications of these Contract Documents.

- B. Payment of 15 percent of manufacturer's quoted price for undelivered, Project-specific manufactured equipment will be made following Shop Drawing approval. Thereafter, monthly payments will be made based on progress of fabrication as determined by Engineer, but in no case will total of payments prior to delivery exceed 75 percent of manufacturer's quoted price.

- C. Failure of Contractor to continue compliance with above requirements shall give cause for Owner to withhold payments made for such equipment from future partial payments.

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. Photographs: Submit two copies (CD).

1.02 OWNER-FURNISHED PRODUCTS

- A. Refer to Section 01 64 00, Owner-Furnished Products.

1.03 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. Electricity Company: Cumberland Electric Membership
2. Water Department: White House Utility District
3. Gas Department: Piedmont Natural Gas

1.04 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.
- 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 heating, 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. Construct Work in the following stages to allow for Owner's continuous occupancy and for uninterrupted operation during construction.
 - 1. RAS / WAS Building. Phase 1 demolition as shown on the Drawings allows for removal of existing RAS/WAS pumps and installation of new RAS WAS pumps. Phase 2 as shown on the Drawings.
- F. Process or Facility Shutdown:
 - 1. Provide 7 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.
- G. Install and maintain temporary connections 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.
- H. 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.
- I. 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.

1.05 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.

1.06 CONSTRUCTION PHOTOGRAPHS

- A. General: Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.

B. 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 3 mega-pixels and 24-bit, millions of color.

- C. Construction Progress Photos: Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.

D. Documentation:

1. Digital Images:
 - a. Electronic image shall have date taken embedded into image.
 - b. Archive using a commercially available photo management system.
 - c. Label each disk with Project and Owner's name, and month and year images were produced.

1.07 REFERENCE POINTS AND SURVEYS

- A. Location and elevation of bench marks are shown on Drawings.
- B. Contractor's Responsibilities:
 - 1. Provide additional survey and layout required to layout the Work.
 - 2. Notify Engineer at least 3 working days in advance of time when grade and line to be provided by Owner will be needed.
 - 3. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
 - 4. In event of discrepancy in data or staking provided by Owner, request clarification before proceeding with Work.
 - 5. Retain professional land surveyor or civil engineer registered in state of Project who shall perform or supervise engineering surveying necessary for additional construction staking and layout.
 - 6. Maintain complete accurate log of survey work as it progresses as a Record Document.
 - 7. On request of Engineer, submit documentation.
 - 8. Provide competent employee(s), tools, stakes, and other equipment and materials as Engineer may require to:
 - a. Establish control points, lines, and easement boundaries.
 - b. Check layout, survey, and measurement work performed by others.
 - c. Measure quantities for payment purposes.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 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 within 5 days 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 monthly 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. Attendees will include:
 - 1. Contractor.
 - 2. Contractor's designated quality control representative.
 - 3. Subcontractors and Suppliers, as necessary.
 - 4. Engineer's representatives.

1.06 PROCESS INSTRUMENTATION AND CONTROL SYSTEMS (PICS)
COORDINATION MEETINGS

- A. Engineer will schedule meetings at Site, conducted bi-monthly 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 4 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 2.03 of the General Conditions.
 2. Detailed Progress Schedule:
 - a. Submit initial Detailed Progress Schedule within 60 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 used for execution of the Work.
 - b. Progress Schedule: Four legible copies and an electronic export from the approved scheduling software.
 - c. Narrative Progress Report: Same number of copies as specified for Progress Schedule.
 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 120 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 Critical Path Network.

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—Critical Path Network.
- 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 specification, this specification 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 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. Delivery dates for Owner-furnished products, as specified in Section 01 11 00, Summary of Work.
 8. Sitework.
 9. Concrete Work.
 10. Structural steel Work.
 11. Architectural features Work.
 12. Conveying systems Work.
 13. Equipment Work.
 14. Mechanical Work.
 15. Electrical Work.
 16. Instrumentation and control Work.
 17. Interfaces with Owner-furnished equipment.
 18. Other important Work for each major facility.
 19. Equipment and system startup and test activities.
 20. Project closeout and cleanup.
 21. Demobilization.

1.05 PROGRESS SCHEDULE—CRITICAL PATH NETWORK

- A. General: Comprehensive computer-generated schedule using CPM, 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 specification, this specification shall govern.
- B. Contents:
1. Schedule shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
 2. Identify Work calendar basis using days as a unit of measure.
 3. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.

4. Identify the Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
5. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project Milestones set forth in the Agreement and Section 01 31 13, Project Coordination.
6. Include as applicable, at a minimum:
 - a. Obtaining permits, submittals for early product procurement, and long lead time items.
 - b. Mobilization and other preliminary activities.
 - c. Initial Site work.
 - d. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s) Subcontract Work.
 - e. Major equipment design, fabrication, factory testing, and delivery dates.
 - f. Delivery dates for Owner-furnished products, as specified in Section 01 11 00, Summary of Work.
 - g. Sitework.
 - h. Concrete Work.
 - i. Structural steel Work.
 - j. Architectural features Work.
 - k. Conveying systems Work.
 - l. Equipment Work.
 - m. Mechanical Work.
 - n. Electrical Work.
 - o. Instrumentation and control Work.
 - p. Interfaces with Owner-furnished equipment.
 - q. Other important Work for each major facility.
 - r. Equipment and system startup and test activities.
 - s. Project closeout and cleanup.
 - t. Demobilization.
7. No activity duration, exclusive of those for Submittals review and product fabrication/delivery, shall be less than 1 day nor more than 30 days, unless otherwise approved.
8. Activity duration for Submittal review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from Engineer.

C. Network Graphical Display:

1. Plot or print on paper not greater than 30 inches by 42 inches or smaller than 22 inches by 34 inches, unless otherwise approved.
2. Title Block: Show name of Project, Owner, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate data date.

3. Identify horizontally across top of 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. Indicate the critical path.
6. Show, at a minimum, the controlling relationships between activities.
7. Plot activities on a time-scaled basis, with the length of each activity proportional to the current estimate of the duration.
8. Plot activities on an early start basis unless otherwise requested by Engineer.
9. Provide a legend to describe standard and special symbols used.

D. Schedule Report:

1. On 8-1/2-inch by 11-inch white paper, unless otherwise approved.
2. List information for each activity in tabular format, including at a minimum:
 - a. Activity Identification Number.
 - b. Activity Description.
 - c. Original Duration.
 - d. Remaining Duration.
 - e. Early Start Date (Actual start on Updated Progress Schedules).
 - f. Early Finish Date (Actual finish on Updated Progress Schedules).
 - g. Late Start Date.
 - h. Late Finish Date.
 - i. Total Float.
3. Sort reports, in ascending order, as listed below:
 - a. Activity number sequence with predecessor and successor activity.
 - b. Activity number sequence.
 - c. Early-start.
 - d. Total float.

1.06 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 an activity is not completed by its latest scheduled completion date and this failure is anticipated to extend Contract Times (or Milestones), submit, within 7 days of such failure, a written statement as to how nonperformance will be corrected to return Project 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.

1.07 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 (for example, lay down and staging areas, construction traffic), use 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.

1.08 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, including updating 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.

1.09 ADJUSTMENT OF CONTRACT TIMES

- A. Reference General Conditions.
- 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, 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. 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 specified otherwise.
 - 1. Jacobs
Attn: Jason English
 - 2. Available at preconstruction conference.
- B. Electronic Submittals: Submittals may be made in electronic format.
 - 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. Provide Engineer with authorization to reproduce and distribute each file as many times as necessary for Project documentation.
 - 9. Detailed 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 in format approved by Engineer.
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 specification.
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 30 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. Copies: Six and one reproducible, except copyrighted documents. 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.
4. Foreign Manufacturers: When proposed, include names and addresses of at least two companies that maintain technical service representatives close to Project.

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.
 - 1) One copy furnished Owner.
 - 2) One copy furnished Resident Project Representative.
 - 3) One copy retained in Engineer's file.
 - 4) Remaining copies returned to Contractor appropriately annotated.

2. Approved as Noted:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - b. Distribution: **[D: Electronic.]**
 - 1) **[E: [F: One copy furnished Owner.]**
 - 2) **One copy furnished Resident Project Representative.**
 - 3) **One copy retained in Engineer's file.**
 - 4) **Remaining copies returned to Contractor appropriately annotated.]**
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: **[G: Electronic.]**
 - 1) **[H: [I: One copy furnished Owner.]**
 - 2) **One copy furnished Resident Project Representative.**
 - 3) **One copy retained in Engineer's file.**
 - 4) **Remaining copies returned to Contractor appropriately annotated.]**
4. Revise and Resubmit:
 - a. Contractor may not incorporate product(s) or implement Work covered by submittal.
 - b. Distribution: **[J: Electronic.]**
 - 1) **[K: One copy furnished Resident Project Representative.**
 - 2) **One copy retained in Engineer's file.**
 - 3) **Remaining copies returned to Contractor appropriately annotated.]**

1.04 INFORMATIONAL SUBMITTALS

A. General:

1. Copies: Submit **[A: three] [B:]** copies, unless otherwise indicated in individual specification section.
2. Refer to individual specification sections for specific submittal requirements.
3. 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 61 00, Common Product Requirements.
 - 7. Manufacturer's Certificate of Proper Installation: In accordance with Section 01 43 33, Manufacturers' Field Services.
- C. **[A: Construction] [B: Photographs] [C: and] [D: Video]: [E: 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. Deferred Submittals: See Drawings for list of deferred submittals.
 - 1. Contractor-design data related to permanent construction:
 - a. List of assumptions.
 - b. List of performance and design criteria.

- c. Summary of loads or load diagram, if applicable.
 - d. Calculations.
 - e. List of applicable codes and regulations.
 - f. Name and version of design software.
 - g. Factory test results.
 - h. Informational submittals requested in individual specification section.
2. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit calculations and test results of Contractor-designed components for review by Engineer. Documentation of review and indication of compliance with general design intent and project criteria provided on Engineer's comment form as meets conditions of the Contract, along with completed submittal, **[A: shall be filed with permitting agency by Contractor] [B: will be filed with permitting agency by Engineer]** and approved by permitting agency prior to installation.
- G. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual specification section.
- H. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- I. 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. **[A: Schedule of Estimated Progress Payments: In accordance with Section 01 29 00, Payment Procedures.]**
- J. Quality Control Documentation: As required in Section 01 45 16.13, Contractor Quality Control.
- K. 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.
- L. Special Guarantee: Supplier's written guarantee as required in individual specification sections.
- M. 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. **[A: Reference Paragraph 1.01.A.38.b of Supplementary Conditions for definition of Specialist.]**
- N. 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.
- O. 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.

P. Testing and Startup Data: In accordance with Section 01 91 14, Equipment Testing and Facility Startup.

Q. Training Data: In accordance with Section 01 43 33, Manufacturers' Field Services.

1.05 SUPPLEMENTS

A. The supplement listed below, following "End of Section", is part of this specification.

1. Form: Transmittal of Contractor's Submittal.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

TRANSMITTAL OF CONTRACTOR'S SUBMITTAL
(ATTACH TO EACH SUBMITTAL)

DATE: _____

<p>TO: _____ _____ _____ _____</p> <p>FROM: _____ Contractor _____ _____ _____</p>	<p>Submittal No.: _____</p> <p><input type="checkbox"/> New Submittal <input type="checkbox"/> Resubmittal</p> <p>Project: _____</p> <p>Project No.: _____</p> <p>Specification Section No.: _____ (Cover only one section with each transmittal)</p> <p>Schedule Date of Submittal: _____</p>
<p>SUBMITTAL TYPE: <input type="checkbox"/> Shop Drawing <input type="checkbox"/> Sample <input type="checkbox"/> Informational</p> <p> <input type="checkbox"/> Deferred</p>	

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

CITY OF WHITE HOUSE

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	formerly 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. Informational Submittals:

1. Training Schedule: Submit, in accordance with requirements of this Specification, not less than **[A: 21] [B:]** days prior to start of equipment installation and revise as necessary for acceptance.
2. Lesson Plan: Submit, in accordance with requirements of this Specification, proposed lesson plan not less than **[C: 21] [D:]** days prior to scheduled training and revise as necessary for acceptance.
3. **[E: Training Session Recordings: Furnish Owner with [F: two] [G:] 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 **[A: Owner] [B: and] [C: 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 **[A: Engineer]** **[B: Owner]**.
 - 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 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.

3.03 TRAINING

A. General:

1. Furnish manufacturers' representatives for detailed classroom and 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 **[A: , and with submission of operation and maintenance manuals in accordance with Section 01 78 23, Operation and Maintenance Data].**
 2. Complete at least **[B: 14] [C:]** 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 **[A: audio] [B: audio and color]** recording of **[C: prestartup] [D: and] [E: post-startup]** instruction sessions, including manufacturers' representatives' **[F: hands-on equipment instruction] [G: and] [H: classroom sessions].**
 2. **[I: Video training materials shall be produced by a qualified, professional video production company.]**
 3. 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.
 4. **[J: Include one training session on each DVD.] [K: DVD may contain multiple training sessions. If multiple training sessions included on a DVD, provide with on-screen menu for playback selection.]**

3.04 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is part of this specification.
1. Manufacturer's Certificate of Proper Installation.

END OF SECTION

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.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. CQC Plan: Submit, not later than 30 days after receipt of Notice to Proceed.
 - 2. CQC Report: Submit, weekly, an original and one copy in report form.

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 [**A: not**] 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 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 QC 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 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. **[A: 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 2012 IBC and is in addition to and supplements requirements included in Statement of Special Inspections shown in supplement located at end of this section.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
 - 2. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.03 DEFINITIONS

- A. Agencies and Personnel:
 - 1. Agency Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
 - 2. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 - 3. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by statutory requirements of professional registration laws of state or jurisdiction in which Project is to be constructed.
 - 4. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of AHJ for inspection of a particular type of construction or operation requiring Special Inspection.

- B. Statement of Special Inspections: Detailed written procedure contained in supplement located at end of this section 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.
- C. 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 area where the Work is being performed.
 - 3. Special Inspection, Periodic: Part-time or intermittent observation of the Work requiring Special Inspection by an approved Special Inspector who is present in area where the Work has been or is being performed, and at completion of the Work.
- D. 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. 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.
 - 3. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to 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.
 - 4. 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.
- E. Nonstructural Components:
 - 1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to structure, including braces, frames, struts, and attachments.

2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical and Plumbing Component Supports: Structural members or assemblies which transmit loads and forces from mechanical or plumbing equipment to structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

F. 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 provided in supplement located at the end of this section.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces and installation of deep foundation elements 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.

1.04 SUBMITTALS

A. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by entity responsible for construction of main wind-force-resisting system, and main seismic-force-resisting system, listed in Statement of Special Inspections. Refer to Article Supplements located at end of section.
2. Fabricator's Certificate of Compliance: Form shall be completed by entity responsible for shop fabrication of structural load-bearing members and assemblies. Refer to Article Supplements located at end of section.

1.05 STATEMENT OF SPECIAL INSPECTIONS REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1705. 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: See Drawings for basic lateral load resisting systems for each structure and other designated wind-resisting components.
 3. Architectural, Plumbing, Mechanical, and Electrical Components subject to Special Inspection under IBC Section 1705.11.5, 1705.11.6, and 1705.12 for Seismic Resistance: As listed in Section 01 45 36, Equipment Seismic Certification.
- B. Statement of Special Inspections:
1. As included in supplement located at the end of this section and in support of building permit application, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge. The following identifies elements of inspection, observation, and testing program to be followed in construction of the Work:
 - a. Designated seismic systems and main seismic force and wind-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 1705 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 or by Authority Having Jurisdiction's (AHJ) approved, qualified inspection staff. Owner will secure and pay for services of agency to perform Special Inspection and associated testing.
- D. Code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections in supplement located at the end of this section and further provided in this section, is for 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 onsite, 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 because of rejection of materials of in place Work that cannot be made compliant to Contract Document without additional inspections and observation and testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Requirements of the Statement of Special Inspections are provided by the Owner. All other testing and inspections, unless noted otherwise, are provided by Contractor.
- B. Provide access to shop or Site for Special Inspection and Testing and Professional Observation requirements.
- C. 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.
- D. Provide access for Special Inspector to construction documents.
- E. Retain special inspection records on-site to be readily available for review.
- F. Cooperate with Special Inspector and provide safe access to the Work to be inspected.
- G. Submit Fabricator's Certificates of Compliance for approved fabricators.

- H. Provide reasonable auxiliary services as requested by the Special Inspector. Auxiliary services required include, but not limited to:
 - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests to assist the Special Inspector in performing test/inspections.
 - 2. Providing storage space for the Special Inspector's exclusive use, such as for storing and curing concrete test samples and delivery of samples to testing laboratories.
 - 3. Providing the Special Inspector with access to all approved submittals.
 - 4. Providing security and protection of samples and test equipment at the Project Site.
 - 5. Provide samples of materials to be tested in required quantities.
- I. When required by Registered Design Professional in Responsible Charge, provide access for plumbing, mechanical and electrical component inspections for those items requiring certification.
- J. Materials and systems shall be inspected during placement where Continuous Special Inspection is required.
- K. Where Periodic Special Inspection is indicated in the Statement of Special Inspections:
 - 1. Schedule inspections for either during or at completion of their placement or a combination or both.
 - 2. Schedule periodically inspected Work (either inspected during or after its placement) so that corrections can be completed and re-inspected before Work is inaccessible.
 - 3. Sampling a portion of the Work is not allowed. Schedules shall provide for inspection of all Work requiring periodic inspection.

3.02 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are a part of this Specification:
 - 1. Contractor's Statement of Responsibility.
 - 2. Fabricator's Certificate of Compliance.
 - 3. Statement of Special Inspections.
 - 4. Tables 1 through 6.

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 wind and seismic force-resisting systems, and for components including architectural, mechanical, and electrical components, as listed in Statement of Special Inspections in supplement located at the end of this section and Section 01 45 36, Equipment Seismic Certification, and that:

- I, (We) aware of the systems and the requirements of the special inspection and acknowledge our responsibility in the implementation of the Statement of Special Inspections for the construction of the following systems:

Facility	Specification	Lateral Force-Resisting System
18 – Alum Feed and Storage Facility	13 34 23	Per Enclosure Manufacturer Engineer
20 – Re-Aeration Blowers	10 73 00	Per Canopy Manufacturer Engineer
40 - UV Facility	10 73 00	Per Canopy Manufacturer Engineer
50 - Operations Building	04 22 00	Special Reinforced Masonry Walls
60 - Electrical Building	04 22 00	Special Reinforced Masonry Walls

2. and I, (We) are responsible for construction of the following components:

Facility	Component
09–Electrical Site Work	Standby Engine Generators (005)
09–Electrical Site Work	Switchgear (060)
09–Electrical Site Work	Secondary Unit Substation Site Work (005)
60 – Electrical Building	Electrical Building (060) (Switchgear, MCC, AFD’s, Etc.)

3. Control of this Work will be exercised to obtain conformance with Contract Documents approved by building official.
4. Procedures within the Contractor’s organization to be used for exercising control of the Work, method and frequency of reporting, and distribution of reports required under Statement of Special Inspections for Project are attached to this statement.
5. I, (We) will provide 48-hour notification to Engineer and approved inspection agency as required for structural tests and Special Inspection for Project.
6. The following person is hereby identified as exercising control over 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: _____

FABRICATOR’S CERTIFICATE OF COMPLIANCE

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2.5 of 2012 IBC must submit Fabricator’s Certificate of Compliance at the completion of fabrication.

(Project)

(Fabricator’s Name)

(Business Address)

(Certification or Approval Agency)

(Certification Number)

(Date of Last Audit or Approval)

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with approved construction documents.

(Name and Title) type or print

(Signature and Date)

Attach copies of fabricator’s certification or building code evaluation service report and fabricator’s quality control manual.

STATEMENT OF SPECIAL INSPECTIONS

GENERAL NOTES

1. THE STATEMENT OF SPECIAL INSPECTIONS PROVIDE PROJECT COMPLIANCE WITH THE PROVISIONS OF THE 2012 INTERNATIONAL BUILDING CODE (IBC) CHAPTER 17 FOR SPECIAL INSPECTION, STRUCTURAL OBSERVATION, AND TESTING FOR WIND AND SEISMIC RESISTANCE AS APPLICABLE. EXCEPT WHERE OTHERWISE NOTED, THIS INSPECTION IS OWNER FURNISHED.
2. STANDARD SPECIAL INSPECTION REQUIREMENTS FOR NONSTRUCTURAL COMPONENTS ARE CONTAINED IN TABLE 1.
3. STANDARD SPECIAL INSPECTION REQUIREMENTS FOR STRUCTURAL COMPONENTS, REGARDLESS OF WIND OR SEISMIC DESIGN CATEGORIES, ARE CONTAINED IN TABLE 2. STANDARD TESTING REQUIREMENTS FOR STRUCTURAL COMPONENTS ARE CONTAINED IN TABLE 3.
4. PROJECT SPECIFIC REQUIREMENTS FOR STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORIES C, D, E, OR F ARE CONTAINED IN TABLE 4. ADDITIONAL TESTING REQUIREMENTS FOR STRUCTURAL RESISTANCE ARE CONTAINED IN TABLE 6.
5. PROJECT SPECIFIC REQUIREMENTS FOR STRUCTURES SUBJECT TO BASIC WIND SPEEDS $[(V_{asd})]$ IN EXCESS OF 110 MPH ARE CONTAINED IN TABLE 5.
6. FOR ADDITIONAL REQUIREMENTS, REFER TO SPECIFICATION SECTION 01 45 33, SPECIAL INSPECTION, OBSERVATION, AND TESTING. THESE INCLUDE:
 - A. CONTRACTOR'S REQUIREMENTS TO PROVIDE ACCESS TO THE WORK FOR REQUIRED INSPECTIONS, AND TO PROVIDE NOTICE OF REQUIRED INSPECTIONS AND STRUCTURAL OBSERVATION.
 - B. CONTRACTOR'S STATEMENT OF RESPONSIBILITY FOR WORK TO BE PERFORMED ON SYSTEMS DESIGNATED UNDER THE STATEMENT OF SPECIAL INSPECTIONS FOR WIND OR SEISMIC RESISTANCE.
 - C. DEFINITIONS AND TERMINOLOGY USED IN THIS STATEMENT OF SPECIAL INSPECTIONS.

SPECIAL INSPECTION

1. SPECIAL INSPECTION WILL BE IN ACCORDANCE WITH IBC SECTIONS 1704 AND 1705 TOGETHER WITH LOCAL AND STATE AMENDMENTS. REFER TO THE FOLLOWING TABLES FOR PROJECT SPECIFIC INSPECTION TYPES AND FREQUENCIES.

2. SPECIAL INSPECTIONS WILL BE PROVIDED BY A CERTIFIED OR QUALIFIED INSPECTOR AND ASSOCIATED TESTING WILL BE PERFORMED BY AN APPROVED ACCREDITED INDEPENDENT AGENCY. THE OWNER WILL SECURE AND PAY FOR THE SERVICES OF THE AGENCY TO PERFORM ALL SPECIAL INSPECTION AND ASSOCIATED TESTS. INSPECTORS FOR EACH SYSTEM AND MATERIAL WILL BE INTERNATIONAL CODE COUNCIL (ICC) CERTIFIED OR OTHERWISE APPROVED BY THE BUILDING OFFICIAL.
3. THE SPECIAL INSPECTOR WILL OBSERVE THE INDICATED WORK FOR COMPLIANCE WITH THE APPROVED CONTRACT DOCUMENTS AND SUBMIT RECORDS OF INSPECTION. ALL DISCREPANCIES WILL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION.
4. SPECIAL INSPECTION AND ASSOCIATED TESTING REPORTS WILL BE SUBMITTED TO THE ENGINEER, CONTRACTOR, BUILDING OFFICIAL, AND OWNER WITHIN ONE WEEK OF INSPECTION OR WITHIN ONE WEEK OF TEST COMPLETION. INSPECTIONS FOR WHICH REPORTING WILL BE REQUIRED ARE NOTED IN THE FOLLOWING TABLES.
5. AT THE CONCLUSION OF CONSTRUCTION, A FINAL REPORT DOCUMENTING REQUIRED SPECIAL INSPECTIONS AND CORRECTION OF PREVIOUSLY NOTED DISCREPANCIES WILL BE SUBMITTED.

GEOTECHNICAL OBSERVATION

1. ALL FOUNDATION BEARING SURFACES SHALL BE INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF REINFORCING STEEL. ADDITIONAL SPECIAL INSPECTION REQUIREMENTS ARE LISTED IN TABLE 1.
2. GEOTECHNICAL TESTING REQUIREMENTS ARE LISTED IN TABLE 3.

STRUCTURAL OBSERVATION

1. STRUCTURAL OBSERVATION WILL BE IN ACCORDANCE WITH IBC SECTION 1704.5 TOGETHER WITH LOCAL AND STATE AMENDMENTS.
2. ONSITE STRUCTURAL OBSERVATION WILL BE PERFORMED FOR EACH IDENTIFIED SEISMIC FORCE- OR WIND FORCE-RESISTING SYSTEM, INCLUDING FOUNDATIONS AND CONNECTIONS. REFER TO THE INDIVIDUAL STRUCTURAL DRAWINGS FOR THE BASIC SEISMIC AND WIND FORCE-RESISTING SYSTEMS FOR THE STRUCTURES INCLUDED IN THE WORK.
3. STRUCTURAL OBSERVATION WILL BE PERFORMED BY A REGISTERED PROJECT DESIGN PROFESSIONAL FOR GENERAL CONFORMANCE TO THE APPROVED CONSTRUCTION DOCUMENTS. STRUCTURAL OBSERVATION DOES NOT INCLUDE OR WAIVE THE RESPONSIBILITY FOR ANY REQUIRED SPECIAL INSPECTIONS OR INSPECTIONS BY THE BUILDING OFFICIAL.

4. STRUCTURAL OBSERVATION REPORTS, NOTING ANY DEFICIENCIES IN OBSERVED CONSTRUCTION, WILL BE DELIVERED TO THE CONTRACTOR, BUILDING OFFICIAL, AND OWNER FOLLOWING EACH OBSERVATION. THE CONTRACTOR WILL BE NOTIFIED ONSITE OR BY PHONE OR E-MAIL WITHIN 24 HOURS UPON FINDING DEFICIENCIES.
5. AT THE CONCLUSION OF CONSTRUCTION, A WRITTEN STATEMENT WILL BE PROVIDED TO VERIFY THAT THE STRUCTURAL OBSERVATION SITE VISITS WERE MADE AND WHETHER THERE REMAIN ANY STRUCTURAL DEFICIENCIES THAT HAVE NOT BEEN RESOLVED.
6. STRUCTURAL OBSERVATION WILL INCLUDE VISUAL OBSERVATION OF THE STRUCTURAL SYSTEM AT SIGNIFICANT CONSTRUCTION STAGES AND AT COMPLETION OF THE STRUCTURAL SYSTEM FOR EACH STRUCTURE CONTAINED IN THE WORK. THE CONTRACTOR SHALL SCHEDULE AND FACILITATE STRUCTURAL OBSERVATION, INCLUDING THE ELEMENTS DESCRIBED IN THE STRUCTURAL OBSERVATION TABLES (ATTACHED).

SPECIAL INSPECTIONS FOR WIND RESISTANCE

1. SPECIAL INSPECTIONS REQUIREMENTS FOR WIND RESISTANCE IN ACCORDANCE WITH IBC SECTION 1705.10 ARE NOT APPLICABLE TO THIS PROJECT.

SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

1. SPECIAL INSPECTIONS REQUIREMENTS FOR SEISMIC RESISTANCE WILL BE IN ACCORDANCE WITH IBC SECTION 1705.11 AND 1705.12 TOGETHER WITH LOCAL AND STATE AMENDMENTS. REFER TO INDIVIDUAL STRUCTURE DRAWINGS FOR BASIC SEISMIC-FORCE-RESISTING SYSTEMS FOR EACH STRUCTURE AND DESIGNATED SEISMIC DESIGN CATEGORY.
2. SPECIAL INSPECTIONS REQUIREMENTS FOR SEISMIC RESISTANCE SHALL APPLY TO THE SYSTEMS AND COMPONENTS LISTED IN TABLE 4.
3. MAIN SYSTEMS REQUIRED TO BE COVERED UNDER PROJECT SPECIAL INSPECTION REQUIREMENTS INCLUDE THE FOLLOWING TOGETHER WITH THEIR CONNECTIONS. REFER TO SECTION 01 45 33, SPECIAL INSPECTION, OBSERVATION AND TESTING.
 - A. 18 – Alum Feed and Storage Facility
 - B. 20 – Re-Aeration Blowers
 - C. 40 - UV Facility (Aluminum Canopy)
 - D. 50 - Operations Building
 - E. 60 - Electrical Building

CITY OF WHITE HOUSE

Statement of Special Inspections Prepared by:

Type or Print Name

Signature

Date

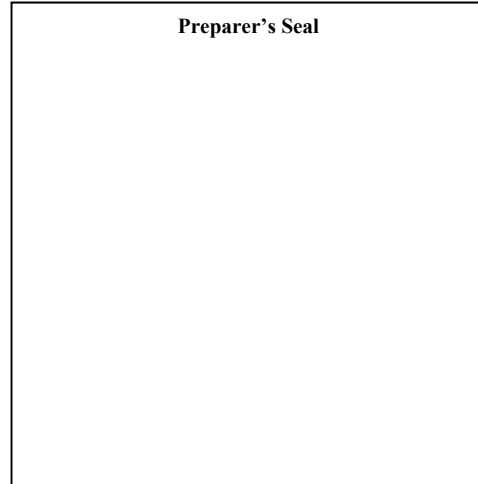


TABLE 1 REQUIRED NON-STRUCTURAL SPECIAL INSPECTION REFER TO SPECIFICATION SECTION 01 45 33						
SYSTEM OR MATERIAL	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
GEOTECHNICAL						
1. SOILS:						
A. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY	1705.6, 1803.5.8, 1803.5.9, 1804.5	SECTION 31 23 13, SUBGRADE PREPARATION	X		PROFESSIONAL OBSERVATION BY GEOTECHNICAL ENGINEER	SEE TABLE 3 FOR CLSM STRENGTH TEST REQUIREMENTS
B. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL	1705.6	SECTION 31 23 16, EXCAVATION	X		PROFESSIONAL OBSERVATION BY GEOTECHNICAL ENGINEER	
C. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS	1705.6	SECTION 31 23 23, FILL AND BACKFILL	X			SEE TABLE 3 FOR GRADATION TEST REQUIREMENTS
D. VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL	1705.6, 1803.5.8	SECTION 31 23 23, FILL AND BACKFILL		X		SEE TABLE 3 FOR DENSITY TEST REQUIREMENTS

<p align="center">TABLE 1 REQUIRED NON-STRUCTURAL SPECIAL INSPECTION REFER TO SPECIFICATION SECTION 01 45 33</p>						
SYSTEM OR MATERIAL	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
E. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY	1705.6	SECTION 31 23 13, SUBGRADE PREPARATION	X		PROFESSIONAL OBSERVATION BY GEOTECHNICAL ENGINEER	SEE TABLE 3 FOR DENSITY TEST AND PROOF ROLLING REQUIREMENTS
2. DEEP FOUNDATION ELEMENTS INCLUDING GROUND IMPROVEMENT WITH RIGID INCLUSION						
A. OBSERVE DRILLING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT	1705.8			X	PROFESSIONAL OBSERVATION BY GEOTECHNICAL ENGINEER	
B. VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM ELEMENT DIAMETERS, LENGTHS, AND ADEQUATE END BEARING STRATA CAPACITY. RECORD CONCRETE OR GROUT VOLUMES.	1705.8			X	PROFESSIONAL OBSERVATION BY GEOTECHNICAL ENGINEER	SEE TABLE 3 FOR PILE INTEGRITY TESTING AND STATIC LOAD TESTING
C. FOR CONCRETE ELEMENTS, PERFORM ADDITIONAL INSPECTION IN ACCORDANCE WITH SECTION 1705.3	1705.8				SEE TABLE 2 FOR REQUIRED INSPECTIONS FOR CONCRETE CONSTRUCTION	

TABLE 1 REQUIRED NON-STRUCTURAL SPECIAL INSPECTION REFER TO SPECIFICATION SECTION 01 45 33						
SYSTEM OR MATERIAL	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
ARCHITECTURAL						
1. WATER-RESISTIVE BARRIER COATING WHEN APPLIED OVER SHEATHING SUBSTRATE	1705.15.1	ASTM E2570	X			
2. FIRE-RESISTANT PENETRATIONS AND JOINTS IN BUILDING ASSIGNED TO RISK CATEGORY III OR IV:						
A. PENETRATION FIRESTOPS	1705.16.1	ASTM E2174	X			
B. FIRE-RESISTANT JOINT SYSTEMS	1705.16.2	ASTM E2393	X			
BUILDING MECHANICAL						
1. INSTALLATION OF SMOKE CONTROL SYSTEMS:						
A. LEAKAGE TESTING AND RECORDING OF DEVICE LOCATIONS PRIOR TO CONCEALMENT	1705.17		X			

TABLE 1**REQUIRED NON-STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33**

SYSTEM OR MATERIAL	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
B. PRIOR TO OCCUPANCY AND AFTER SUFFICIENT COMPLETION, PRESSURE DIFFERENCE TESTING, FLOW MEASUREMENTS, AND DETECTION AND CONTROL VERIFICATION	1705.17		X			
GENERAL						
1. CONSTRUCTION MATERIALS AND SYSTEMS THAT ARE ALTERNATIVES TO MATERIALS AND SYSTEMS PRESCRIBED BY CODE	1705.1.1 ITEM 1		X			
2. UNUSUAL DESIGN APPLICATION OF CODE MATERIALS	1705.1.1 ITEM 2			X		
3. INSTALLATION OF MATERIALS THAT REQUIRE ADDITIONAL MANUFACTURER'S INSTRUCTIONS BEYOND CODE REQUIREMENTS	1703.4.2, 1705.1.1 ITEM 3	ICC-ES EVALUATION REPORTS		X		

TABLE 1 REQUIRED NON-STRUCTURAL SPECIAL INSPECTION REFER TO SPECIFICATION SECTION 01 45 33						
SYSTEM OR MATERIAL	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
STRUCTURAL						
SEE TABLE 2.						

NOTES:

1. PERIODIC INSPECTION IS DEFINED AS INSPECTION BY THE SPECIAL INSPECTOR OF ALL MATERIALS AND SYSTEMS, IN SOME CASES PERFORMED DURING THEIR PLACEMENT AND IN ALL CASES PERFORMED UPON COMPLETION OF THEIR PLACEMENT. THE COMPLETION INSPECTION SHALL BE PERFORMED SO THAT WORK CAN BE CORRECTED PRIOR TO OTHER RELATED WORK PROCEEDING AND COVERING INSPECTED WORK.

TABLE 2 REQUIRED STRUCTURAL SPECIAL INSPECTION REFER TO SPECIFICATION SECTION 01 45 33						
SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
CONCRETE						
1. INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT	1705.3, 1903.1, 1910.4	ACI 318: 3.5, 7.1-7.7	X			SEE TABLE 6 FOR REINFORCING STEEL TESTING
2. INSPECTION OF ANCHORS CAST IN CONCRETE	1705.3, 1908.5, 1909.1	ACI 318: 8.1.3	X			
3. INSPECTION OF ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS	1705.3, 1909.1	ACI 318: 3.8.6, 8.1.3, ICC-ES EVALUATION REPORTS	X		PROVIDE CONTINUOUS SPECIAL INSPECTION FOR ADHESIVE ANCHORS DESIGNED TO RESIST SUSTAINED TENSION LOADS AND WHERE REQUIRED BY ICC-ES REPORT	
4. VERIFYING USE OF REQUIRED DESIGN MIX	1705.3, 1904.2, 1910.2, 1910.3	ACI 318: Ch. 4, 5.2-5.4	X			
5. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE	1705.3, 1910.10	ASTM C 172, ASTM C 31, ACI 318: 5.6, 5.8		X		SEE TABLE 3 FOR CONCRETE TEST REQUIREMENTS

TABLE 2						
REQUIRED STRUCTURAL SPECIAL INSPECTION						
REFER TO SPECIFICATION SECTION 01 45 33						
SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
6. INSPECTION OF CONCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES	1705.3, 1910.6, 1910.7, 1910.8	ACI 318: 5.9, 5.10		X		
7. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES	1705.3, 1910.9	ACI 318: 5.11-5.13	X			
8. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED	1705.3	ACI 318: 6.1.1	X			
9. INSPECTION OF WATERSTOPS FOR PROPER SHAPE, LOCATION, JOINT QUALITY, AND SURROUNDING CONCRETE PLACEMENT			X			
10. VERIFY PROPER INSTALLATION OF MECHANICAL REINFORCING SPLICES AND CONNECTIONS	1705.1.1 ITEM 3, 1705.3	ICC-ES EVALUATION REPORTS	X			
MASONRY VENEER AND MASONRY LEVEL B						
1. FOR SELF-CONSOLIDATING GROUT: VERIFICATION OF SLUMP FLOW AND VISUAL STABILITY INDEX (VSI) AS DELIVERED TO THE PROJECT SITE.	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 1.5B.1.b.3	X			

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SPECIAL INSPECTION, OBSERVATION, AND TESTING

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TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
2. VERIFICATION OF f'_m AND f'_{AAC} PRIOR TO CONSTRUCTION EXCEPT WHERE SPECIFICALLY EXEMPTED BY CODE	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 1.4B	X			
3. VERIFY COMPLIANCE WITH THE APPROVED SUBMITTALS	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 1.5	X			
4. AS MASONRY CONSTRUCTION BEGINS, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:						
A. PROPORTIONS OF SITE-PREPARED MORTAR	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 2.1, 2.6A	X			
B. CONSTRUCTION OF MORTAR JOINTS	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.3B	X			
C. LOCATION OF REINFORCEMENT, CONNECTORS AND ANCHORAGES	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.4, 3.6A	X			
D. PROPERTIES OF THIN-BED MORTAR FOR AAC MASONRY	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 2.1C	X		CONTINUOUS INSPECTION REQUIRED FOR THE FIRST 5000 SQUARE FEET OF AAC MASONRY	
5. PRIOR TO GROUTING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:						
A. GROUT SPACE	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.2D, 3.2F	X			

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
B. GRADE, TYPE, AND SIZE OF REINFORCEMENT AND ANCHOR BOLTS, AND ANCHORAGES	1705.4	ACI 530: Sec. 1.16, 1.19.2 ACI 530.1: Art. 2.4, 3.4	X			
C. PLACEMENT OF REINFORCEMENT, CONNECTORS, AND ANCHORAGES	1705.4	ACI 530: Sec. 1.16, 1.19.2 ACI 530.1: Art. 3.2E, 3.4, 3.6A	X			
D. PROPORTIONS OF SITE-PREPARED GROUT	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 2.6B, 2.4G.1.b	X			
E. CONSTRUCTION OF MORTAR JOINTS	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.3B	X			
6. VERIFY DURING CONSTRUCTION:						
A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.3F	X			
B. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES, OR OTHER CONSTRUCTION	1705.4	ACI 530: Sec. 1.16.4.3, 1.17.1, 1.19.2	X			

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
C. PREPARATION, CONSTRUCTION, AND PROTECTION OF MASONRY DURING COLD WEATHER (TEMP. BELOW 40 DEGREES F) OR HOT WEATHER (TEMP. ABOVE 90 DEGREES F)	1705.4, 2104.3, 2104.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 1.8C, 1.8D	X			
D. PLACEMENT OF GROUT FOR BONDED TENDONS IS IN COMPLIANCE	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.5, 3.6C		X		
E. PLACEMENT OF AAC MASONRY UNITS AND CONSTRUCTION OF THIN-BED MORTAR JOINTS	1705.4	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 3.3B.8	X		CONTINUOUS INSPECTION REQUIRED FOR THE FIRST 5000 SQUARE FEET OF AAC MASONRY	
7. OBSERVE PREPARATION OF GROUT SPECIMENS, MORTAR SPECIMENS, AND/OR PRISMS	1705.4, 2105.2.2, 2105.3	ACI 530: Sec. 1.19.2 ACI 530.1: Art. 1.4B.2	X			SEE TABLE 3 FOR UNIT STRENGTH TESTS FOR MASONRY
STRUCTURAL STEEL						
1. MATERIAL VERIFICATION OF STRUCTURAL STEEL:						
A. IDENTIFICATION MARKINGS TO CONFORM TO AISC 360	1705.2.1, 2203.1	Applicable ASTM Material Standards	X			
B. MANUFACTURER'S CERTIFIED TEST REPORTS	1705.2.1	AISC 360: Sec. N3.2, N5.2	X			

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
2. PRIOR TO BOLTING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:						
A. MANUFACTURER'S CERTIFICATIONS AVAILABLE FOR FASTENER MATERIALS	1705.2.1	AISC 360: Sec. N3.2, N5.2, N5.6 RCSC: Sec. 2.1, 9.1		X		
B. FASTENERS MARKED IN ACCORDANCE WITH ASTM REQUIREMENTS	1705.2.1	AISC 360: Sec. N3.2, N5.2, N5.6 Applicable ASTM Material Standards	X			
C. PROPER BOLTING PROCEDURE SELECTED FOR JOINT DETAIL	1705.2.1	AISC 360: Sec. N5.6 RCSC: Sec. 4	X			
D. CONNECTING ELEMENTS, INCLUDING THE APPROPRIATE FAYING SURFACE CONDITION AND HOLE PREPARATION, IF SPECIFIED, MEET APPLICABLE REQUIREMENTS	1705.2.1	AISC 360: Sec. N5.6 RCSC: Sec. 3.2, 4	X			
E. PRE-INSTALLATION VERIFICATION TESTING BY INSTALLATION PERSONNEL OBSERVED AND DOCUMENTED FOR FASTENER ASSEMBLIES AND METHODS USED	1705.2.1	AISC 360: Sec. N5.6 RCSC: Sec. 7		X		

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
F. PROPER STORAGE PROVIDED FOR BOLTS, NUTS, WASHERS AND OTHER FASTENER COMPONENTS	1705.2.1	AISC 360: Sec. N5.6 RCSC: Sec. 2.2	X			
3. VERIFY DURING BOLTING:						
A. FASTENER ASSEMBLIES, OF SUITABLE CONDITION, PLACED IN ALL HOLES AND WASHERS (IF REQUIRED) ARE POSITIONED AS REQUIRED	1705.2.1	AISC 360: Sec. N5.6	X			
B. JOINT BROUGHT TO SNUG-TIGHT CONDITION PRIOR TO THE PRETENSIONING OPERATION	1705.2.1	AISC 360: Sec. N5.6	X			
C. FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	1705.2.1	AISC 360: Sec. N5.6	X			
D. FASTENERS ARE PRETENSIONED IN ACCORDANCE WITH THE RCSC SPECIFICATION, PROGRESSING SYSTEMATICALLY FROM THE MOST RIGID POINT TOWARD THE FREE EDGES	1705.2.1	AISC 360: Sec. N5.6	X			SEE TABLE 3 FOR TESTING OF HIGH-STRENGTH BOLTING

TABLE 2						
REQUIRED STRUCTURAL SPECIAL INSPECTION						
REFER TO SPECIFICATION SECTION 01 45 33						
SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
4. PRIOR TO WELDING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:						
A. APPROVED WELDING PROCEDURE SPECIFICATIONS (WPS) AVAILABLE TO WELDERS AND WELDING INSPECTOR(S)	1705.2.1	AWS D1.1	X			
B. WELDER QUALIFICATIONS AND JOINT FIT-UP	1705.2	AWS D1.1	X		NOTE 2	ALSO SEE REQUIREMENTS OF SPEC. SECTION 05 05 23
5. VERIFY DURING WELDING:						
A. CONTROL AND HANDLING OF WELDING CONSUMABLES	1705.2.1	AWS D1.1	X			
B. ENVIRONMENTAL CONDITIONS	1705.2.1	AWS D1.1	X			
C. COMPLIANCE WITH WPS REQUIREMENTS	1705.2.1	AWS D1.1	X		NOTE 2	ALSO SEE REQUIREMENTS OF SPEC. SECTION 05 05 23 AND TABLE 3 FOR STRUCTURAL STEEL TEST REQUIREMENT
6. AFTER WELDING, VERIFY THE FOLLOWING:						
A. SIZE, LENGTH AND LOCATION OF WELDS	1705.2.1	AWS D1.1	X		NOTE 2	

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
B. WELDS MEET VISUAL ACCEPTANCE CRITERIA	1705.2.1	AWS D1.1	X		NOTE 2	ALSO SEE REQUIREMENTS OF SPEC. SECTION 05 05 23
C. BACKING REMOVED AND WELD TABS REMOVED (IF REQUIRED)	1705.2.1	AWS D1.1	X			
D. NONDESTRUCTIVE WELDING INSPECTION	1705.2	AWS D1.1	X		NOTE 2	ALSO SEE REQUIREMENTS OF SPEC. SECTION 05 05 23
7. INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE:						
A. DETAILS SUCH AS BRACING AND STIFFENING	1705.2.1		X			
B. MEMBER LOCATIONS	1705.2.1		X			
C. APPLICATION OF JOINT DETAILS AT EACH CONNECTION	1705.2.1		X			
STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL						
1. MATERIAL VERIFICATION OF COLD-FORMED STEEL DECK:						
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	1705.2.2, 2203.1	Applicable ASTM Material Standards	X			
B. MANUFACTURER'S CERTIFIED TEST REPORTS	1705.2.2		X			

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
2. CONNECTION OF COLD-FORMED STEEL DECK TO SUPPORTING STRUCTURE:						
A. ROOF DECK WELDS	1705.2.2	AWS D1.3	X		NOTE 2	ALSO SEE REQUIREMENTS OF SPEC. SECTION 05 05 23
B. OTHER FASTENERS: VERIFY FASTENERS ARE IN CONFORMANCE WITH APPROVED SUBMITTAL	1705.2.2	AISC 360: SEC N6	X			
C. OTHER FASTENERS: VERIFY FASTENERS INSTALLATION IS IN ACCORDANCE WITH APPROVED SUBMITTAL	1705.2.2	AISC 360: SEC N6	X			
3. COLD-FORMED STEEL TRUSSES SPANNING 60 FEET OR MORE, VERIFY TEMPORARY INSTALLATION RESTRAINT/BRACING AND THE PERMANENT INDIVIDUAL TRUSS MEMBER RESTRAINT/BRACING ARE INSTALLED IN ACCORDANCE WITH THE APPROVED TRUSS SUBMITTAL PACKAGE	1705.2.2.2		X			

TABLE 2
REQUIRED STRUCTURAL SPECIAL INSPECTION
REFER TO SPECIFICATION SECTION 01 45 33

SYSTEM	2012 IBC CODE REFERENCE	REFERENCED STANDARD	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
ALUMINUM						
1. MATERIAL VERIFICATION OF ALUMINUM:						
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	1705.1.1 ITEM 2		X			
B. MANUFACTURERS' CERTIFIED MILL TEST REPORTS	1705.1.1 ITEM 2		X			
2. INSPECTION OF WELDING:						
A. NONDESTRUCTIVE INSPECTION	1705.1.1 ITEM 2	AWS D1.2	X		NOTE 2	ALSO SEE REQUIREMENTS OF SPEC. SECTION 05 05 23

NOTES:

1. PERIODIC INSPECTION IS DEFINED AS INSPECTION BY THE SPECIAL INSPECTOR OF ALL MATERIALS AND SYSTEMS, IN SOME CASES PERFORMED DURING THEIR PLACEMENT AND IN ALL CASES PERFORMED UPON COMPLETION OF THEIR PLACEMENT. THE COMPLETION INSPECTION SHALL BE PERFORMED SO THAT WORK CAN BE CORRECTED PRIOR TO OTHER RELATED WORK PROCEEDING AND COVERING INSPECTED WORK.

2. VISUAL INSPECTION IS THE RESPONSIBILITY OF THE CONTRACTOR'S WELDING INSPECTOR(S) AND IS NOT CONSIDERED SPECIAL INSPECTION. CONTRACTOR MUST PROVIDE A QUALIFIED WELDING INSPECTOR TO OVERSEE CONTRACTOR'S WELDING OPERATIONS, AS REQUIRED BY AWS D1.1, SECTIONS 6.1.2 & 6.6, SPEC. SECTION 05 05 23 AND REFERENCED WELDING CODES.

Notes to User:

INFO 1. (LIMIT USE TO HIGH CHALLENGE ENVIRONMENTS PER ICC REVIEW OF S72-04/05) --not code adopted but proposed). A high challenge environment is a high importance diaphragm, shear wall, connections, joints, etc that effect the lateral load resisting system.

TABLE 3 TESTING FOR REQUIRED SPECIAL INSPECTION REFER TO SPECIFICATION SECTION 01 45 33						
MATERIAL	TYPE OR SCOPE	STANDARD	2012 IBC CODE REFERENCE	FREQUENCY	BY WHOM	COMMENTS
GEOTECHNICAL						
COMPACTED FILL	GRADATION	ASTM C117, C136	1705.6	SECTION 31 23 23, FILL AND BACKFILL	OWNER'S TESTING AGENCY	
COMPACTED FILL	COMPACTION	ASTM D698, D1557	1705.6	SECTION 31 23 23, FILL AND BACKFILL	OWNER'S TESTING AGENCY	
COMPACTED FILL	DENSITY	ASTM D1556, D6938	1705.6	SECTION 31 23 23, FILL AND BACKFILL	OWNER'S TESTING AGENCY	
PREPARED SUBGRADE	DENSITY	ASTM D698, D1557	1705.6	SECTION 31 23 13, SUBGRADE PREPARATION	OWNER'S TESTING AGENCY	
CAST-IN-PLACE DEEP FOUNDATIONS INCLUDING GROUND IMPROVEMENT WITH RIGID INCLUSIONS	STATIC LOAD PILE TESTING	ASTM D1143	1705.9	SECTION 31 63 20 - GROUND IMPROVEMENT WITH RIGID INCLUSIONS	OWNER'S TESTING AGENCY CONTRACTOR TO PERFORM STATIC LOAD TESTING BUT OWNER'S REP SHOULD BE PRESENT DURING TESTING	
CAST-IN-PLACE DEEP FOUNDATIONS INCLUDING GROUND IMPROVEMENT WITH RIGID INCLUSIONS	PILE INTEGRITY TESTING	ASTM D5882	1705.8	SECTION 31 09 17, DYNAMIC PILE TESTING	OWNER'S TESTING AGENCY CONTRACTOR TO HIRE SUB TO PERFORM INTEGRITY TESTING.	
CONCRETE						
CONCRETE	STRENGTH	ASTM C39	1705.3	ONCE EACH DAY, BUT NOT LESS THAN ONE SAMPLE FOR EACH 150 CUBIC YARDS OR 5,000 SFT OF WALLS OR SLABS PLACED	OWNER'S TESTING AGENCY	
CONCRETE	SLUMP	ASTM C143, C94	1705.3	ONE SAMPLE PER STRENGTH TEST	OWNER'S TESTING AGENCY	
CONCRETE	AIR CONTENT	ASTM C231, C94	1705.3	ONE SAMPLE PER STRENGTH TEST	OWNER'S TESTING AGENCY	
CONCRETE	TEMPERATURE	ASTM C1064	1705.3	ONE SAMPLE PER STRENGTH TEST	OWNER'S TESTING AGENCY	

TABLE 3						
TESTING FOR REQUIRED SPECIAL INSPECTION						
REFER TO SPECIFICATION SECTION 01 45 33						
MATERIAL	TYPE OR SCOPE	STANDARD	2012 IBC CODE REFERENCE	FREQUENCY	BY WHOM	COMMENTS
MASONRY						
CONCRETE MASONRY	UNIT STRENGTH	ASTM C140	2105.2.2.1.2	ONE SAMPLE SET (6 FULL SIZE UNITS) PER 5,000 SQ. FT. DURING CONSTRUCTION	OWNER'S TESTING AGENCY	
CLAY MASONRY	UNIT STRENGTH	ASTM C67	2105.2.2.1.1	ONE SAMPLE SET (5 FULL SIZE UNITS) PER 5,000 SQ. FT. DURING CONSTRUCTION	OWNER'S TESTING AGENCY	
MASONRY	COMPRESSIVE STRENGTH OF GROUT	ASTM C1019	2105.2.2.1	THREE SAMPLES PRIOR TO CONSTRUCTION	OWNER'S TESTING AGENCY	
MASONRY	PRISM	ASTM C1314	2105.2.2.2	TEST THREE PRISMS PRIOR TO CONSTRUCTION	OWNER'S TESTING AGENCY	
STEEL						
HIGH-STRENGTH BOLTING	PRE-INSTALLATION VERIFICATION TESTING OF PRETENSIONED BOLTS	RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS, Sec. 7	1705.2	3 FASTENER ASSEMBLIES OF EACH COMBINATION OF DIAMETER, LENGTH, GRADE AND LOT	OWNER'S TESTING AGENCY	
STRUCTURAL STEEL	ULTRASONIC OR RADIOGRAPHIC NONDESTRUCTIVE TESTING	AWS D1.1	1705.2	SECTION 05 05 23, WELDING	OWNER'S TESTING AGENCY	PERFORM RT OR UT ON GROOVE WELDS
REINFORCING STEEL	MAGNETIC PARTICLE NONDESTRUCTIVE TESTING	AWS D1.4	1705.3, 1903.1	SECTION 05 05 23, WELDING	OWNER'S TESTING AGENCY	PERFORM ON FILLET WELDS AND PARTIAL JOINT PENETRATION WELDS

TABLE 4

**REQUIRED SPECIAL INSPECTION FOR SEISMIC RESISTANCE FOR STRUCTURAL SYSTEMS
REFER TO TABLE 2 FOR STANDARD STRUCTURAL SPECIAL INSPECTION REQUIREMENTS
REFER TO SPECIFICATION SECTION 01 45 33**

The Seismic Design Category (SDC) for this Project is D.

SYSTEM	INSPECTION REQUIRED FOR FOLLOWING SEISMIC DESIGN CATEGORIES	2012 IBC CODE REFERENCE	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
ARCHITECTURAL						
INSTALLATION AND ANCHORAGE OF SUSPENDED CEILING SYSTEMS	"D" AND ABOVE	1705.11.5	X			
INSTALLATION OF OTHER SEISMIC SUPPORTS FOR DESIGNATED ARCHITECTURAL SYSTEMS AND THEIR COMPONENTS	"D" AND ABOVE	1705.11.5	X			SEE TABLE 6
ELECTRICAL						
INSTALLATION OF ANCHORAGE OF ELECTRICAL EQUIPMENT FOR EMERGENCY OR STANDBY POWER SYSTEMS	"C" AND ABOVE	1705.11.6 ITEM 1	X		NOTES 2 & 3	
INSTALLATION OF PIPING INTENDED TO EQUIPMENT USING COMBUSTIBLE ENERGY SOURCES	"C" AND ABOVE	1705.11.6 ITEM 1			NOTES 2 & 3	
INSTALLATION OF VIBRATION ISOLATION SYSTEMS WHERE THE CONSTRUCTION DOCUMENTS REQUIRE A NOMINAL CLEARANCE OF 0.25 INCHES OR LESS BETWEEN THE EQUIPMENT SUPPORT FRAME AND RESTRAINT	"C" AND ABOVE	1705.11.6 ITEM 5	X		NOTES 2 & 3	
INSTALLATION OF OTHER SEISMIC SUPPORTS FOR DESIGNATED ELECTRICAL SYSTEMS AND THEIR COMPONENTS	"C" AND ABOVE	1705.11.6	X		NOTES 2 & 3	SEE TABLE 6

TABLE 4

**REQUIRED SPECIAL INSPECTION FOR SEISMIC RESISTANCE FOR STRUCTURAL SYSTEMS
REFER TO TABLE 2 FOR STANDARD STRUCTURAL SPECIAL INSPECTION REQUIREMENTS
REFER TO SPECIFICATION SECTION 01 45 33**

The Seismic Design Category (SDC) for this Project is D.

SYSTEM	INSPECTION REQUIRED FOR FOLLOWING SEISMIC DESIGN CATEGORIES	2012 IBC CODE REFERENCE	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
PROCESS MECHANICAL						
INSTALLATION OF PIPING SYSTEMS MEANT TO CARRY HAZARDOUS MATERIALS AND ITS ASSOCIATED MECHANICAL UNITS	"C" AND ABOVE	1705.11.6 ITEM 3	X			
INSTALLATION OF OTHER SEISMIC SUPPORTS FOR DESIGNATED MECHANICAL SYSTEMS AND THEIR COMPONENTS	"C" AND ABOVE	1705.11.6	X		NOTES 2 & 3	SEE TABLE 6
BUILDING MECHANICAL						
INSTALLATION AND ANCHORAGE OF HVAC DUCTWORK THAT WILL CONTAIN HAZARDOUS MATERIALS	"C" AND ABOVE	1705.11.6 ITEM 4	X			
INSTALLATION OF FIRE PROTECTION SPRINKLER SYSTEM	"D" AND ABOVE	1705.11.6	X			
INSTALLATION OF OTHER SEISMIC SUPPORTS FOR DESIGNATED MECHANICAL SYSTEMS AND THEIR COMPONENTS	"C" AND ABOVE	1705.11.6	X		NOTES 2 & 3	SEE TABLE 6
STRUCTURAL						
STRUCTURAL STEEL INSPECTION OF SEISMIC-FORCE-RESISTING SYSTEMS	"C" AND ABOVE	1705.11.1, AISC 341		X		SEE TABLE 6 FOR STRUCTURAL STEEL TESTING
COLD FORMED STEEL LIGHT-FRAMED CONSTRUCTION: WELDING, SCREW ATTACHMENT, BOLTING, ANCHORING AND OTHER FASTENINGS WITHIN THE SEISMIC FORCE-RESISTING SYSTEM INCLUDING SHEAR WALLS, BRACES, DIAPHRAGMS, COLLECTORS (DRAG STRUTS), AND HOLD-DOWNS	"C" AND ABOVE	1705.11.3	X		NOTE 4	

TABLE 4

**REQUIRED SPECIAL INSPECTION FOR SEISMIC RESISTANCE FOR STRUCTURAL SYSTEMS
REFER TO TABLE 2 FOR STANDARD STRUCTURAL SPECIAL INSPECTION REQUIREMENTS
REFER TO SPECIFICATION SECTION 01 45 33**

The Seismic Design Category (SDC) for this Project is D.

SYSTEM	INSPECTION REQUIRED FOR FOLLOWING SEISMIC DESIGN CATEGORIES	2012 IBC CODE REFERENCE	PERIODIC OWNER FURNISHED SPECIAL INSPECTION (SEE NOTE 1)	CONTINUOUS OWNER FURNISHED SPECIAL INSPECTION	COMMENTS	TESTING FOR SPECIAL INSPECTION
INSPECT AND VERIFY THAT THE DESIGNATED SEISMIC SYSTEM COMPONENTS ARE LABELED AND ANCHORAGE OR MOUNTING CONFORMS TO THE CERTIFICATE OF COMPLIENCE	"C" AND ABOVE	1705.11.4	X			

NOTES:

1. PERIODIC INSPECTION IS DEFINED AS INSPECTION BY THE SPECIAL INSPECTOR OF ALL MATERIALS AND SYSTEMS, IN SOME CASES PERFORMED DURING THEIR PLACEMENT AND IN ALL CASES PERFORMED UPON COMPLETION OF THEIR PLACEMENT. THE COMPLETION INSPECTION SHALL BE PERFORMED SO THAT WORK CAN BE CORRECTED PRIOR TO OTHER RELATED WORK PROCEEDING AND COVERING THE INSPECTED WORK
2. TESTING OF SYSTEMS AND THEIR ANCHORAGE SHALL BE IN CONFORMANCE WITH 2012 IBC SECTION 1705.12.3.
3. CERTIFICATION OF SYSTEMS AND THEIR ANCHORAGE SHALL BE IN CONFORMANCE WITH 2012 IBC SECTION 1705.12.3.
4. NOT REQUIRED IF SHEATHING IS GYPSUM BOARD OR FIBERBOARD OR IF SHEATHING IS WOOD STRUCTURAL PANEL OR STEEL SHEETS ON ONE SIDE OF PANEL OR DIAPHRAGM ONLY AND THE FASTENER SPACING IS MORE THAN 4 INCHES.

TABLE 5

**REQUIRED SPECIAL INSPECTION FOR WIND RESISTANCE FOR STRUCTURAL SYSTEMS
REFER TO SPECIFICATION SECTION 01 45 33**

The Nominal Design Wind Speed (3-second-gust) for this Project is 93 mph.
The Wind Exposure is Category C.

NOT REQUIRED.

TABLE 6
TESTING FOR SEISMIC RESISTANCE
REFER TO SPECIFICATION SECTION 01 45 33

MATERIAL	TYPE OR SCOPE	STANDARD	2012 IBC CODE REFERENCE	FREQUENCY	BY WHOM	COMMENTS
OTHER						
DESIGNATED SEISMIC SYSTEM COMPONENTS (AND ASSOCIATED ANCHORAGES) SUBJECT TO PROVISIONS OF ASCE 7 SECTION 13.2.2	CERTIFICATE OF COMPLIANCE	ASCE 7 SECTION 13.2.2	1705.12.3	EACH SYSTEM OR COMPONENT	MANUFACTURER	NOTE 2
DESIGNATED SEISMIC SYSTEM COMPONENTS (AND ASSOCIATED ANCHORAGES) SUBJECT TO PROVISIONS OF ASCE 7 SECTION 13.2.1	CERTIFICATE OF COMPLIANCE	ASCE 7 SECTION 13.2.1	1705.12.3	EACH SYSTEM OR COMPONENT	MANUFACTURER	NOTE 2

NOTES:

- TESTING AND QUALIFICATION FOR SEISMIC RESISTANCE ARE REQUIRED FOR SEISMIC-FORCE-RESISTING SYSTEMS IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E, OR F, UNLESS OTHERWISE NOTED.
- BASED ON ACTUAL TEST ON SHAKE TABLE, BY THREE-DIMENSIONAL SHOCK TESTS, BY AN ANALYTICAL METHOD USING DYNAMIC CHARACTERISTICS AND FORCES, BY THE USE OF EXPERIENCE DATA, OR BY MORE RIGOROUS ANALYSIS PROVIDING FOR EQUIVALENT SAFETY.

**SECTION 01 45 36
EQUIPMENT SEISMIC CERTIFICATION**

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers the code required seismic certification of mechanical and electrical equipment in accordance with 2012 IBC, Chapter 17.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 344, Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
 - b. 693, Recommended Practice for Seismic Design of Substations.
 3. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.
 4. National Fire Protection Association (NFPA): 13, Standard for Installation of Sprinkler Systems.

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.
- B. Component Supports:
1. Electrical: 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.
 2. Mechanical: 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.

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1.04 SUBMITTALS

A. Informational Submittals:

1. Seismic Qualification of Mechanical and Electrical Equipment Certification of Compliance: Submit for mechanical and electrical components having a component importance factor of 1.5 as designated herein. Submit for other components having component importance factor of 1.0 where test results are submitted as an alternate to required calculations under 13.2.5 of ASCE 7 -10. Refer to Article Supplements located at end of section.
2. If required by Engineer, submit documentation of testing results or analytical data.

1.05 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

- A. Complete special inspection and testing in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Architectural, mechanical, and electrical components subject to special inspection and testing under IBC Section 1705.11 for seismic resistance, as listed in table in Article Mechanical and Electrical Component Certification are in addition to requirements of Section 01 45 33, Special Inspection, Observation, and Testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MECHANICAL AND ELECTRICAL COMPONENT CERTIFICATION

- A. Provide certificate of compliance for mechanical and electrical component testing and certification on form located at end of section. Provide certificates for equipment and components listed in the following table:

Mechanical and Electrical Components Requiring Certification of Compliance for Seismic Testing or Analysis under IBC Section 1705.12.3			
Facility	Component	Component Importance Factor, I_p	Component to Remain Operable?
09-Electrical Site Work	Standby Engine Generators	1.5	Yes
09-Electrical Site Work	Switchgear	1.5	Yes
	Secondary Unit Substation	1.5	Yes

Mechanical and Electrical Components Requiring Certification of Compliance for Seismic Testing or Analysis under IBC Section 1705.12.3			
Facility	Component	Component Importance Factor, I_p	Component to Remain Operable?
09–Electrical Site Work	Standby Engine Generators (005)	1.5	Yes
09–Electrical Site Work	Switchgear (060)	1.5	Yes
09–Electrical Site Work	Secondary Unit Substation Site Work (005)	1.5	Yes
60 – Electrical Building	Electrical Building (060) (Switchgear, MCC, AFD’s, Etc.)	1.5	Yes

- B. Certify mechanical and electrical components listed in table above on basis of tests on a shaking table, by three-dimensional shock tests, by an analytical method using dynamic characteristics, and forces as provided in Section 01 88 15, Anchorage and Bracing, experience data demonstrating acceptable seismic performance, or by more rigorous analysis. Submitted testing and experience data shall meet requirements of ASCE 7 -10 Section 13.2.5 and Section 13.2.6, respectively.
- C. Component and attachment testing and certification shall be in accordance with applicable provisions of IBC Section 1705.12.3. Seismic testing and certification is in addition to functional and performance testing required for new equipment for field quality control or start-up testing as indicated in technical specification.
- D. Where equipment is required to remain operable following the design earthquake ground motion, active parts or energized components shall be certified on basis of approved shake table testing or experience only unless demonstrably similar to other equipment so qualified.
- E. Components with hazardous contents shall be certified to contain materials under the design earthquake.

3.02 SUPPLEMENTS

- A. The supplement listed below, following “End of Section,” is a part of this Specification:
 - 1. Seismic Qualification of Mechanical and Electrical Equipment Certificate of Compliance.

END OF SECTION

**SEISMIC QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT
CERTIFICATE OF COMPLIANCE**

(Component under Certification)

(Name of Manufacturer)

(Tag Number or Equipment ID)

(Business Address)

(Drawing/Detail Number)

(Telephone)

This is to certify that above-referenced component meets or exceeds requirements of Section 1705.12.3 of 2012 IBC for seismic qualification of equipment. Basis of qualification is by:

(Check Applicable)

- Shake-table Test
- Three-dimensional Shock Test
- Analytical Method
- Experience Data
- Conformance with NFPA 13 for fire protection sprinkler systems.
- Other _____

under acceptance criteria of:

- ICC-ES AC156, Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems
- IEEE 693, IEEE Recommended Practice for Seismic Design of Substations
- IEEE 344, IEEE Recommended Standard Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations for experience data
- ASCE 7 -10 Chapter 13 for analytical methods
- Other _____

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for the following earthquake hazard rating:

IEEE Seismic Qualification Level: _____

Mapped MCE, 5 Percent Damped, Short Period Spectral Response
Acceleration, S_s : _____

Design, 5 Percent Damped, Short Period Spectral Response
Acceleration, S_{DS} : _____

Component Importance Factor, I_p : _____

Component Response Modification Factor, R_p : _____

Height of Point of Attachment as Factor of Average Roof Height,
 z/h : _____

This certification covers both the integrity of the equipment and anchorage of equipment. Required mounting and anchorage details are shown on attached Seismic Outline Drawing for the most seismically vulnerable component covered by this certification.

Manufacturer's Representative Signature: _____

Address: _____

Date: _____

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 Association of Nurserymen (AAN): 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); Electronic Industries Alliance (EIA): 568B, 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. Informational Submittals:
1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
 2. **[A: Temporary Utility Submittals:]**
 - a. **[B: Electric power supply and distribution plans.]**
 - b. **[C: Water supply and distribution plans.]**
 - c. **[D: Dewatering well locations.]**
 - d. **[E: Sanitary.]**
 3. **[F: Temporary Construction Submittals:]**
 - a. **[G: Access Roads: Routes, cross-sections, and drainage facilities.]**
 - b. **[H: Parking area plans.]**
 - c. **[I: Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.]**
 - d. **[J: Fencing and protective barrier locations and details.]**
 - e. **[K: Engineer's field office plans.]**
 - f. **[L: Staging area location plan.]**
 - g. **[M: Traffic and Pedestrian Control and Routing Plans: As specified herein, and proposed revisions thereto.]**

- h. **[N: Plan for maintenance of existing plant operations.]**
- 4. **[O: Temporary Control Submittals:]**
 - a. **[P: Noise control plan.]**
 - b. **[Q: Dust control plan.]**
 - c. **[R: Plan for disposal of waste materials and intended haul routes.]**

1.03 MOBILIZATION

- A. Mobilization includes, but is not limited to, these principal items:
 - 1. Obtaining required permits.
 - 2. Moving Contractor's field office and equipment required for first month operations onto Site.
 - 3. Installing temporary construction power, wiring, and lighting facilities.
 - 4. Providing onsite Internet service **[A: and telephones].**
 - 5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
 - 6. Arranging for and erection of Contractor's work and storage yard.
 - 7. Posting OSHA required notices and establishing safety programs and procedures.
 - 8. Having Contractor's superintendent at Site full time.
 - 9. **[B: Providing Engineer's facilities.]**
- B. **[A: Use area designated for Contractor's temporary facilities as shown on Drawings.] [B: No area is available at Site on Owner's property for Contractor's temporary facilities. Provide lands and access to lands for temporary facilities for use by Contractor for duration of Project.] [C:]**
- C. **[A: [B: Progress payment for mobilization will not be approved.] [C: No more than half of Schedule of Values mobilization line item will be approved] prior to installation of Engineer's Field Office [D: , including internet service].]**

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: **[A: No blasting or use of explosives will be allowed onsite.] [B: Blasting will be allowed as specified in Section 31 23 16.27, Blasting Controls.]**

1.05 VEHICULAR TRAFFIC

A. Traffic Control Plan:

1. Adhere to traffic control plan **[A: included in Contract Documents]** **[B: reviewed and accepted by Engineer]**. Changes to this plan shall be made only by written approval of **[C: appropriate public authority]** **[D: Engineer]**. Secure approvals for necessary changes so as not to delay progress of the Work.
2. Provide lanes tabulated below to accommodate vehicular traffic. Remaining portion of streets within limits of the Work may be closed to through traffic. Obtain police department approval prior to restricting or eliminating parking lanes.

Number and Width of Lanes for Through Traffic					
Street	Time	North Bound	South Bound	East Bound	West Bound
[A:]	[B:]	[C:]	[D:]	[E:]	[F:]

[G: *Maintain traffic lanes wide enough or located to include an allowable travel path for semitrailer trucks to turn onto cross streets.]

- B. Traffic Routing Plan: Show sequences of construction affecting use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.

PART 2 PRODUCTS

2.01 ENGINEER’S FIELD OFFICES

- A. Furnish equipment specified for exclusive use of Engineer and its’ representatives.
- B. Ownership of equipment furnished under this article will remain, unless otherwise specified, that of Contractor.
- C. Equipment furnished shall be new or like new in appearance and function.
- D. Minimum Features:
 1. 110-volt lighting and wall plugs.
 2. Fluorescent ceiling lights.

3. Electric heating [**A: and self-contained air conditioning unit,**] properly sized for Project locale and conditions. Provide ample electric power to operate installed systems.
 4. [**B: Covered entrances with**] [**C: Provide**] railed stairways, [**D: and**] landings [**E: , and exterior lighting**] [**F: at entrances**].
 5. Sign on entrance door reading [**G: JACOBS, letter height 4 inches minimum**] [**H:**].
 6. Exterior Door(s):
 - a. Number: [**I: One.**] [**J: Two.**] [**K:** .]
 - b. Type: Solid core.
 - c. Lock(s): Cylindrical [**L: ; keyed alike**].
 7. Number of Windows: [**M: Two.**] [**N: Seven.**] [**O:** .]
 8. Minimum Interior Height: 8 feet.
- E. Floor Space: Minimum [**A: 225**] [**B:**] square feet.
- F. Rooms: [**A: Two**] [**B:**], with minimum private office floor space of [**C: 80**] [**D:**] square feet, and remainder configured for open meeting or storage space.
- G. Plan table; plan rack; [**A: one**] [**B: two**] double desk(s) with desk surface located 29 inches from floor; two 2-drawer, steel file cabinets; and overhead shelf(s).
- H. Floor Space: Minimum [**A: 150**] [**B:**] square feet.
- I. Plan table; plan rack; double desk with desk surface located 29 inches from floor; two 2-drawer, steel file cabinets; and overhead shelf.
- J. If Engineer's office is to be located in same structure as superintendent's office, partition off area for Engineer's use and provide a separate, lockable entrance.
- K. Trailer Type Mobile Structure: [**A: One.**] [**B:** .]
- L. Floor Space: Minimum [**A: 425**] [**B:**] square feet.
- M. All-metal frame; all-metal exterior, sides, and roof; and insulated double walls, floor, and roof.
- N. Security guard screens on windows.
- O. Toilet and wash basin in separate compartment with hot and cold water and drains.
- P. Number of Private Offices: [**A: Two, 10 feet by 10 feet.**] [**B:** .]

- Q. Storage Room: **[A: One, 6 feet by 8 feet]** **[B:]**, with door with cylinder lock, keyed differently than exterior door locks. Provide **[C: two]** **[D:]** sets of keys.
- R. Shelving in Storage Room: **[A: 72 linear feet, 18 inches deep.]** **[B: .]**
- S. Blinds or drapes on windows.
- T. Work Surface: **[A: One, 30 inches by 10 feet at desk height of 29 inches from floor.]** **[B: .]**
- U. Office Equipment—General:
1. Bottled Water Service: **[A: One]** **[B:]** **[C: , with cooler capable of producing hot water and cold water.]**
 2. Paper Cup Dispenser with Cups: **[D: One.]** **[E: .]**
 3. Paper Towel Dispenser with Towels: **[F: One.]** **[G: .]**
 4. Desk: **[H: One]** **[I:]**, steel, 30 inches by 60 inches with desk surface located 29 inches from floor.
 5. Desk Chair: **[J: One]** **[K:]**, with the following characteristics:
 - a. Five castor base.
 - b. Adjustable height.
 - c. Swivels.
 - d. Locking Back.
 - e. Adjustable seat back for height and angle.
 - f. Adjustable arms.
 6. Folding Table: **[L: One]** **[M:]**, 36 inches by 72 inches.
 7. Steel Folding Chairs: **[N: Two.]** **[O: .]**
 8. Drafting Table: **[P: One, 3 feet by 6 feet.]** **[Q: .]**
 9. Drafting Stool: **[R: One.]** **[S: .]**
 10. Four-Drawer Steel File with Lock: **[T: One]** **[U:]**, **[V: legal]** **[W: letter]** width.
 11. Drawing Rack with Drawing Hangers: **[X: Two.]** **[Y: .]**
 12. Bookcase: **[Z: Two]**, **[A:]**, 36 inches wide by **[B: 48]** **[C: 84]** inches high.
 13. Wastepaper Basket: **[D: Two.]** **[E: .]**
 14. Blue Recycling Basket: **[F: Two.]** **[G: .]**
 15. Clothes Rack: **[H: One.]** **[I: .]**
 16. First-Aid Kit: **[J: One.]** **[K: .]**
 17. Tri-Class (ABC), Dry Chemical Fire Extinguisher, 10-Pound: **[L: One.]** **[M: .]**
 18. **[N: Telephone: [O: Two]** **[P:]**, with one intercom line and **[Q: two]** **[R:]** incoming/outgoing lines, Touch-Tone, with conference speaker, and 12-foot coiled handset cord.]

19. Digital Answering Machine: Model as approved by Engineer. Must have capability to retrieve messages remotely.

V. Computer Hardware:

1. Desktop Computer:
 - a. Dell [A: ; .]
 - b. Hard Drive, One Each per Computer:
 - 1) 160GB, 7200 RPM, SATA.
 - 2) **[B: CD/DVD ROM: 16X DVD +/-RW, with 10 CDs.]**
2. Video Memory: [C: .]
3. Modem: V.92/56K.
4. Monitor: One each per computer; 20-inch LCD wide flat panel, minimum.
5. **[D: Accessories:]**
 - a. **[E: Free Standing Document Holder: [F: 8-1/2 inches by 11 inches] [G: and] [H: 11 inches by 17 inches].]**
 - b. **[I: Adjustable Keyboard Tray, large enough to accommodate standard keyboard and mouse.]**
 - c. **[J: Wrist rest for keyboard.]**
 - d. **[K: Wrist rest and pad for mouse.]**
 - e. **[L: Foot rest, slanted and small enough to fit under desk.]**
 - f. **[M: Monitor arm.]**
 - g. **[N: Monitor risers.]**
 - h. **[O: Laptop Accessories:**
 - 1) **External Mouse: [P: Two-] [Q: Three-] button.**
 - 2) **External keyboard.**
 - 3) **Riser.]**
6. Power Supply Surge Protector: One each per computer; rated at 15 amps minimum.
7. **[R: Uninterruptible Power Supply (UPS): APC Smart, sized for minimum 15-minute run time for computers.]**
8. Printer: [S:] each; HP LaserJet [T:].
9. **[U: Printer Accessories: [V:] [W: Manufacturer's standard network-attached storage device.] [X: Black and color toner cartridges.]**
10. Maintenance service agreements for all hardware for duration of Contract.

W. Computer Software:

1. Microsoft Windows [A: 7] [B:].
2. Microsoft Office [C: 2013] [D:], [E: Standard] [F: Professional] Edition.

3. Document Control System (Most Current Version): [G: Primavera; [H:]].] [I: Procore; [J:]].] [K: .]
4. Scheduling (most current version): [L: Primavera Project Planner.] [M: .]

2.02 PROJECT SIGN

- A. [A: Refer to Project Sign Detail on Drawings.] [B: Provide and maintain one, 8-foot-wide by 4-foot-high sign constructed of 3/4-inch exterior high density overlaid plywood. Sign shall bear name of Project, Owner, Contractor, Engineer, and other participating agencies. Lettering shall be [C: blue] [D:] applied on [E: white] [F:] background by an experienced sign painter. Include [G: Owner's] [H: Project's] [I: and agency's] [J: logo] [K: logos] in [L: [M: three] [N:] colors] [O: full color]. Provide exterior type enamel paint.] Information to be included and logo graphic will be provided by [P: Engineer.] [Q: Owner.]

PART 3 EXECUTION

3.01 ENGINEER'S FIELD OFFICE

- A. Make available for Engineer's use prior to start of the Work at Site and to remain on Site for minimum of [A: 30] [B:] days after final acceptance of the Work.
- B. Locate where directed by Engineer; level, block, tie down, skirt, provide stairways, and relocate when necessary and approved. Construct on proper foundations, and provide proper surface drainage and connections for utility services.
- C. Provide minimum 100 square feet of gravel or crushed rock base, minimum depth of 4 inches, at each entrance.
- D. Raise grade under field office, as necessary, to elevation adequate to avoid flooding.
- E. Provide sanitary facilities in compliance with state and local health authorities.
- F. Exterior Door Keys: Furnish [A: two] [B:] set(s) of keys.
- G. [A: Telephone:
 1. Provide number of incoming lines equal to that specified for telephone type.
 2. Provide appropriate jacks; locate as directed by Engineer.

3. **Provide wiring necessary for complete telephone system.]**
- H. Computer: Provide required connecting cables and plugs.
- I. **[A: Local Area Network (LAN):]**
 1. **[B: Provide Ethernet network prewired in compliance with EIA/TIA 568B.]**
 2. **[C: Ethernet [D: wired] [E: wireless] hub shall be capable of a minimum of [F: four] [G:] connections.]**
 3. **[H: LAN shall be designed and installed by personnel experienced in similar LAN systems.]**
- J. Telecommunications:
 1. Provide **[A: DSL] [B: cable]** Internet connection with minimum of **[C: five] [D:]** live portable computer (PC) ports.
 2. Provide appropriate jacks, wiring, and equipment required for a complete telecommunications system.
 3. Arrange and provide for telecommunication service for use during construction. Pay costs of installation, maintenance, and monthly service of internet connection.
- K. Maintain in good repair and appearance, and provide **[A: daily] [B: weekly]** cleaning service and replenishment, as required, of paper towels, paper cups, hand soap, toilet paper, first-aid kit supplies, and bottled water.
- L. Replenish, as needed, copy paper and toner.

3.02 TEMPORARY UTILITIES

- A. Power:
 1. **[A: No electric power is available at Site. Make arrangements to obtain and pay for electrical power used until final payment and acceptance by Owner, unless otherwise recommended by Engineer at Substantial Completion.]**
 2. **[B: Electric power will be available [C: at or near Site.] [D: as shown.]] [E: 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, except for portions of the Work designated in writing by Engineer as substantially complete.]**
 3. **[F: Cost of electric power will be borne by [G: Owner.] [H: 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. **[A: Costs for temporary heat shall be borne by Contractor responsible for constructing structure or building as specified in Section 01 11 00, Summary of Work.]**
 2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
 3. Pay costs of installation, maintenance, operation, removal, and fuel consumed.
 4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
 5. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of utility company. Provide separate gas metering as required by utility.
- D. Water:
1. **[A: No construction or potable water is available at Site. Make arrangements for and bear costs of providing water required for construction purposes and for drinking by construction personnel during construction.]**
 2. **[B: Hydrant Water:]**
 - a. **[C: Is available from nearby hydrants. Secure written permission for connection and use from water department and meet requirements for use. Notify fire department before obtaining water from fire hydrants.]**
 - b. **[D: Use only special hydrant-operating wrenches to open hydrants. Make certain hydrant valve is open full, since cracking valve causes damage to hydrant. Repair damaged hydrants and notify appropriate agency as quickly as possible. Hydrants shall be completely accessible to fire department at all times.]**
 - c. **[E: Include costs to connect and transport water to construction areas in Contract Price.]**

3. **[F: Owner will provide a place of temporary connection for [G: construction] [H: and] [I: drinking] water at Site. Provide temporary facilities and piping required to bring water to point of use and remove when no longer needed. Install an acceptable metering device and pay for water used at Owner's current rate.]**
4. **[J: Owner will furnish [K: construction] [L: and] [M: drinking] water required [N: at no cost to Contractor] [O: on Site] [P: at location shown.] [Q: Furnish and install temporary piping and facilities to transport water to the Work.]**
5. **[R: Provide] [S: and] [T: bear costs of] [U: necessary water] [V: in excess of _____ gpm] [W: required for testing equipment, tanks or basins, and piping prior to Substantial Completion, unless otherwise specifically stated in Specifications for equipment, systems, or facilities to be tested.]**
6. **[X: Provide means to prevent water used for testing from flowing back into source pipeline.]**
7. **[Y:]**

E. Sanitary and Personnel Facilities:

1. **[A: Provide and maintain facilities for Contractor's employees, Subcontractors, and other onsite employers' employees. Service, clean, and maintain facilities and enclosures.]**
2. **[B: Obtain Owner's permission before allowing construction personnel to use existing sanitary facilities at Site.] [C: Use of Owner's existing sanitary facilities by construction personnel will not be allowed.]**

F. Telephone Service:

1. Contractor: Arrange and provide onsite telephone service for use during construction. Pay costs of installation and monthly bills.
2. Engineer: Arrange and provide onsite telephone system for use during construction. Pay for installation and basic monthly billing charges. **[A: Engineer] [B: Owner] [C: will pay Engineer's long distance charges.] [D: Contractor shall pay Engineer's long distance charges from [E: \$400] [F:] monthly allowance.] [G: At Project completion, difference between total actual long distance charges and cumulative amount of this allowance will be adjusted by Change Order.]**
3. **[H: No incoming calls allowed to Owner's plant telephone system.]**

- G. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

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 property owners and the public.
2. No residence or business shall be cut off from vehicular traffic for a period exceeding [A: 4] [B:] hours, unless special arrangements have been made.
3. **[C: Schedule the Work so construction will not interfere with irrigation of cultivated lands or pasturelands. Construction may proceed during irrigation season, provided Contractor constructs temporary irrigation ditches, turnouts, and miscellaneous structures acceptable to property owners.]**
4. **[D: Provide continuous access for livestock through farm areas. Do not cut off ready access to portions of farmlands in which livestock are pastured. Maintain existing fences required to restrain livestock. Keep gates closed and secure.]**
5. 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.
6. 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.
7. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
8. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
9. 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.
10. 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.
11. 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.

12. Maintain original Site drainage wherever possible.

B. Site Security:

1. Erect a temporary security fence [**A: at locations shown on Drawings**] for protection of [**B: Owner-furnished products**] [**C: and**] [**D: existing facilities,**] as specified in Section [**E: 32 31 13, Chain Link Fences and Gates**] [**F:**]. Maintain fence throughout construction period. Obtain Engineer's written permission before removal of temporary security fencing.
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 [**A:**] 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 and property owners.
5. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
6. Locate barricades at the nearest intersecting public thoroughfare on each side of blocked section.
7. Illuminate barricades and obstructions with warning lights from sunset to sunrise.

D. Signs and Equipment:

1. Conform to requirements of manual published by the [**A: State**] [**B:**] Department of Transportation.
2. Portable TOW-AWAY-NO STOPPING Signs: Place where approved by police department [**C: and Owner**].
3. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.
4. High-Level Warning Flag Units: Provide [**D: two**] [**E:**] in advance of traffic approaching the Work, each displaying three flags mounted at a height of 9 feet.

5. ROAD CONSTRUCTION AHEAD Signs: Provide [F: four] [G:], size 48 inches by 48 inches. Place in conspicuous locations, approximately 200 feet in advance of the Work, and facing approaching traffic.
6. DETOUR Signs: Provide [H: two] [I:], right arrow or left arrow, placed as approved by [J: Engineer] [K:].
7. RIGHT or LEFT LANE CLOSED AHEAD Signs: Provide [L: two] [M:], place in advance of lane to be closed.
8. Provide at obstructions, such as material piles and equipment.
9. Use to alert general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public 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.
 - a. Where practical, tunnel beneath trees when on or near line of trench.
 - b. Employ hand excavation as necessary to prevent tree injury.
 - c. Do not stockpile materials or permit traffic within drip lines of trees.
 - d. Provide and maintain temporary barricades around trees.
 - e. Water vegetation as necessary to maintain health.
 - f. Cover temporarily exposed roots with wet burlap, and keep burlap moist until soil is replaced around roots.
 - g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of Engineer.
 - h. Dispose of removed trees in a legal manner off the Site.
2. Balling and burlapping of trees indicated for replacement shall conform to recommended specifications set forth in the American Standards for Nursery Stock, published by American Association of Nurserymen. Balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by ball and not by top.
3. 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.
4. 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 Engineer.
 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:
1. Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.
 2. [A: .]
- I. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, 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 foundations and parts of the Work free from water.
- J. [A: Archaeological Finds:
1. **General: Should finds of an archaeological or paleontological nature be made within Site limits, immediately notify Owner and Engineer and proceed in accordance with General Conditions. Continue the Work in other areas without interruption.**
 2. **Archaeological Finds: Evidence of human occupation or use of an area within contract limits prior to the Year [B: 1840.] [C: .] Evidence may consist of skeletons, stone, or other utensils, or evidence of habitations or structures.**
 3. **Paleontological Finds: Evidence of prehistoric plant or animal life, such as skeletons, bones, fossils, or casts and other indications such as pictographs.**
 4. **Owner may order the Work stopped in other areas if, in Owner's opinion, find is more extensive than may appear from uncovered material.**
 5. **Protection of Finds:**
 - a. **Cover, fence, or otherwise protect finds until notice to resume the Work is given.**
 - b. **Cover finds with plastic film held in place by earth, rocks, or other weights placed outside the find. Should additional**

- backfilling be necessary for safety or to prevent caving, place backfill material loosely over plastic film.**
- c. **Sheet or shore as necessary to protect excavations underway. Place temporary fence to prevent unauthorized access.**
 - d. **Dewater finds made below water table as necessary to protect construction Work underway. Divert groundwater or surface runoff away from find by ditching or other acceptable means.**
6. **Removal of Finds:**
- a. **Finds are property of Owner. Do not remove or disturb finds without Owner's written authorization.**
 - b. **Should Owner elect to have a find removed, provide equipment, labor, and material to permit safe removal of find without damage. Provide transportation for delivery to individuals, institutions, or other places as Owner may find desirable, expedient, or required by law.]**
- K. **Endangered and Threatened Species:**
- 1. Take precautions necessary and prudent to protect native endangered and threatened flora and fauna.
 - 2. Notify Engineer of construction activities that might threaten endangered and threatened species or their habitats.
 - 3. Engineer will mark areas known as habitats of endangered and threatened species prior to commencement of onsite activities.
 - 4. Additional areas will be marked by Engineer 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:
 - a. **[A: Of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.]**
 - b. **[B: Flammable debris and refuse may be burned onsite provided requirements set forth by proper fire authorities and air quality control agencies are met.]**
 - c. **[C: Authority to burn shall not relieve Contractor from damages that may result from its operations.]**
 - d. **[D: Do not burn on easements through private property, unless specifically permitted in writing by property owner, in addition to complying with state, county, and local regulations regarding burning.]**

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.
2. Noise Control Ordinance: **[A: .]**
3. Noise Control Plan: Propose plan to 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 **[A: Engineer's]** **[B: 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 Sedimentation 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 Sedimentation 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. Coordinate requirements with Section 01 61 00, Common Product Requirements.
- B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- C. 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: AND DETOURS]

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits. **[A: Use existing roads where shown.] [B: Alignments for new routes shall be approved by Engineer.]**
- 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 Engineer detours and other operations affecting traffic and access. Provide at least 72 hours' notice to Engineer of operations that will alter access to Site **[A: and] [B:]**.
- F. Where access road crosses existing fences, install and maintain gates. Gates and gate posts shall conform to those as specified in Section **[A: 32 31 13, Chain Link Fences and Gates] [B:]**.
- G. Upon completion of construction, **[A: restore ground surface disturbed by access road construction to original grade.] [B: leave access roads in condition suitable for future use by Owner.] [C: Replace damaged or broken culverts with new culvert pipe of same diameter and material.]**

3.07 PARKING AREAS

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.
- B. Provide parking facilities for personnel working on Project. No employee or equipment parking will be permitted on Owner's existing paved areas [**A: , except as specifically designated for Contractor's use**].
- C. [**A: Use area designated on Drawings for parking of Contractor's and Contractor's employees' vehicles.**] [**B: .**]

3.08 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. No public or private road shall be closed, except by written permission of proper authority. Ensure the least possible obstruction to traffic and normal commercial pursuits.
- B. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
- D. Road Closures: Maintain satisfactory means of exit for persons residing or having occasion to transact business along route of the Work. If it is necessary to close off roadway or alley providing sole vehicular access to property for periods greater than 2 hours, provide written notice to each owner so affected 3 days prior to such closure. In such cases, closings of up to 4 hours may be allowed. Closures of up to 10 hours may be allowed if a week's written notice is given and undue hardship does not result.
- E. Maintenance of traffic is not required if Contractor obtains written permission from Owner and tenant of private property, or from authority having jurisdiction over public property involved, to obstruct traffic at designated point.
- F. In making street crossings, do not block more than one-half the street at a time. Whenever possible, widen shoulder on opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.

- G. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access driveways where required. Cleanup operations shall follow immediately behind backfilling.
- H. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.
- I. **[A: Provide snow removal to facilitate normal vehicular traffic on public or private roads affected by construction. Perform snow removal promptly and efficiently by means of suitable equipment whenever necessary for safety, and as may be directed by proper authority.]**
- J. Notify fire department and police department before closing street or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, 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.
- K. **[A: Temporary Bridges:**
1. **Construct temporary bridges at points where maintenance of traffic across pipeline construction is necessary.**
 2. **Make bridges over public streets, roads, and highways acceptable to authority having jurisdiction thereover.**
 3. **Bridges erected over private roads and driveways shall be adequate for service to which they will be subjected.**
 4. **Provide substantial guardrails and suitably protected approaches.**
 5. **Provide footbridges not less than 4 feet wide with handrails and uprights of dressed lumber.**
 6. **Maintain bridges in place as long as conditions of the Work require their use for safety of public, except that when necessary for proper prosecution of the Work in immediate vicinity of bridge. Bridge may be relocated or temporarily removed for such period as Engineer may permit.]**
- L. **[A: Detours:**
1. **Where authority having jurisdiction requires that traffic be maintained over construction work in a public street, road, or highway, and traffic cannot be maintained on original roadbed or pavement, construct and maintain detour around the Work.**
 2. **Detour Striping:**

- a. **5 days prior to starting Work on each sequence of the Project where detour striping is required, notify [B: City] [C:] Traffic Engineer's office to allow [D: City] [E:] sufficient time to paint approved detour striping.**
 - b. **Clean pavement in area to be marked and have personnel available to assist painting crew by adjusting barricading for detour modification.**
 - c. **When detour striping is no longer needed, notify [F: City] [G:] Traffic Engineer's office and sandblast off temporary detour lane markings which would not conform to permanent existing striping.]**
- M. Coordinate traffic routing with that of others working in same or adjacent areas.

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 least weekly, sweep floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up and dispose of debris.
- 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.
- D. At least weekly, brush sweep entry drive, roadways, and other streets and walkways affected by the Work and where adjacent to the Work.

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers Work necessary for stabilization of soil to prevent erosion during construction and sediment control measures are indicated on the Drawings. Engineer reserves right to modify use, location, and quantities of soil erosion and sediment control measures based on activities by Contractor.
- B. Comply with Federal, state, and local laws, rules and regulations, and the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Discharge Permit or Permits applicable to the Project. A copy of the Project's General Construction Permit and Stormwater Pollution Prevention Plan is available from Owner.

1.02 REFERENCES

- A. Erosion and sediment control activities shall conform to the Tennessee Department of Environment and Conservation (TDEC) Erosion and Sediment Control Handbook, latest edition.
- B. The following is a list of standards that may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. D638, Standard Test Method for Tensile Properties of Plastics.
 - b. D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 - c. D3776/D3776M, Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.
 - d. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - e. D4632/D4632M, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - f. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile
 - g. D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
 - 2. U.S. Department of Agriculture, Natural Resources Conservation Service: *Urban Hydrology for Small Watersheds*; 1986. Technical Release 55.

3. U.S. Environmental Protection Agency:
 - a. Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, 2007. EPA-833-R-06-004.
 - b. National Menu of BMPs, 2012.

1.03 SYSTEM DESCRIPTION

- A. Erosion and Sediment Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases during construction period.
 1. Soil erosion and sediment control devices consist of the following elements: Construction of silt fences and inlet protection.
- B. To the degree possible, coordinate this temporary Work with permanent drainage and erosion control work the Contract requires.
- C. Engineer may require additional temporary control measures if it appears pollution or erosion may result from weather, nature of materials, or progress on the Work.
- D. If Engineer orders the Work suspended, continue to control erosion, pollution, and runoff during the shutdown.
- E. Nothing in this section shall relieve Contractor from complying with other Contract requirements.

1.04 SUBMITTALS

- A. Informational Submittals:
 1. Stormwater Pollution prevention Plan (SWPPP).
 2. TDEC Construction Inspection Certifications.

PART 2 PRODUCTS

2.01 CHECK DAMS

- A. Specified by Contractor with approval of Engineer.

2.02 COIR LOG

- A. Logs made of 100 percent durable coconut (coir) fiber uniformly compacted within woven netting.
- B. Netting: Made of bristle coir twine with minimum strength of 80 pounds tensile strength. Nominal 2-inch by 2-inch openings.

- C. Log Segments: Maximum length of 20 feet, with a minimum diameter as shown on the Drawings.
- D. Log Minimum Density: 7 lbs/cf.
- E. Stakes: Untreated softwood species with a notch to secure rope ties.
- F. Rope Ties: 1/4-inch diameter commercially available hemp rope.

2.03 COMPOST SOCK

- A. Provide socks fabricated from of extra heavy weight biodegradable fabric, with a minimum strand thickness of 5 mils.
- B. Fill fabric with Coarse Compost.
- C. Diameter: 8 inches minimum.
- D. Fabric: Clean, evenly woven, and free of encrusted concrete or other contaminating materials. Shall be free from cuts, tears, broken or missing yarns. Shall be free of thin, open, or weak areas. Shall be free of any type of preservative.
- E. Wood Stakes: Untreated softwood species, be 2-inch by 2-inch nominal dimension and 36 inches in length.

2.04 EROSION CONTROL BLANKET (MATTING), BIODEGRADABLE

- A. Temporary erosion control blanket shall be made of natural plant fibers. Supply independent test results meeting the following:

Properties	ASTM Test Method	Requirements
Protecting Slopes from Rainfall-Induced Erosion	D6459: Test in one soil type. Soil tested shall be sandy loam as defined by the NRCS Soil Texture Triangle.	Maximum C factor of 0.15 using Revised Universal Soil Loss Equation (RUSLE)
Dry Weight per Unit Area	D6475	0.36 lb/sq. yd. minimum
Performance in Protecting Earthen Channels from Stormwater-Induced Erosion	D6460: Test in one soil type. Soil tested shall be loam as defined by the NRCS Soil Texture Triangle.	1.0 lb/sq. ft. minimum
Seed Germination Enhancement	D7322	200 percent minimum
Netting, if present, shall be biodegradable with a life span not to exceed 1 year.		

2.05 GEOTEXTILE

- A. Geotextiles shall consist only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. Geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. Geotextile properties shall be as described in Table 1 through Table 3.

Table 1 Geotextile for Permanent Erosion Control							
Geotextile Property	ASTM Test Method	Geotextile Property Requirements					
		Permanent Erosion Control				Ditch Lining	
		Moderate Survivability		High Survivability			
		Woven	Nonwoven	Woven	Nonwoven	Woven	Nonwoven
AOS	D4751	See Table 2		See Table 2		U.S. No. 30 max.	
Water Permittivity	D4491	See Table 2		See Table 2		0.02 sec ⁻¹ min.	
Grab Tensile Strength, in machine and x-machine direction	D4632/D4632M	250 lb min.	160 lb min.	315 lb min.	200 lb min.	250 lb min.	160 lb min.
Grab Failure Strain, in machine and x-machine direction	D4632/D4632M	15% -50%	≥50%	15% -50%	≥50%	<50%	≥50%
Seam Breaking Strength	D4632/D4632M	220 lb min.	140 lb min.	270 lb min.	180 lb min.	220 lb min.	140 lb min.
Puncture Resistance	D6241	495 lb min.	310 lb min.	620 lb min.	430 lb min.	495 lb min.	310 lb min.
Tear Strength, in machine and x-machine direction	D4533	80 lb min.	50 lb min.	112 lb min.	79 lb min.	80 lb min.	50 lb min.
Ultraviolet (UV) Radiation Stability	D4355	70% strength retained min., after 500 hours in xenon arc device					

Table 2				
Filtration Properties for Geotextile for Permanent Erosion Control				
Geotextile Property	ASTM Test Method	Geotextile Property Requirements		
		Class A	Class B	Class C
AOS	D4751	U.S. No. 40 max.	U.S. No. 60 max.	U.S. No. 70 max.
Water Permittivity	D4491	0.7 sec ⁻¹ min.	0.4 sec ⁻¹ min.	0.2 sec ⁻¹ min.

Table 3			
Geotextile for Temporary Silt Fence			
Geotextile Property	ASTM Test Method	Geotextile Property Requirements	
		Unsupported Between Posts	Supported Between Posts with Wire or Polymeric Mesh
AOS	D4751	U.S. No. 30 max. for silt wovens, U.S. No. 50 for all other geotextile types, U.S. No. 100 min.	
Water Permittivity	D4491	0.2 sec ⁻¹ min.	
Grab Tensile Strength, in machine and x-machine direction	D4632/ D4632M	180 lb min. in machine direction, 100 lb min. in x-machine direction	100 lb min.
Grab Failure Strain, in machine and x-machine direction	D4632/ D4632M	30% max. at 180 lb or more	
Ultraviolet (UV) Radiation Stability	D4355	70% strength retained min., after 500 hours in xenon arc device	

2.06 OUTLET PROTECTION

- A. Size riprap or quarry spall to resist movement under design flows. Install at least 8 inches deep. Provide riprap or quarry spall material free of extraneous material.

2.07 PLASTIC COVERING

- A. Clear plastic meeting requirements of ASTM D4397 for polyethylene sheeting having a minimum thickness of 6 mils.

2.08 SEDIMENT CONTROL BARRIERS

- A. Specified by Contractor with approval of Engineer. May include Compost Filter Sock or Compost Filter Berm.

2.09 SEEDING

- A. See Section 32 92 00, Turf and Grasses.

2.10 SILT (SEDIMENT) FENCE

- A. Geotextile: As specified in Article Geotextile.
- B. Support Posts: As recommended by manufacturer of geotextile.
- C. Fasteners: Heavy-duty wire staples at least 1-inch long, tie wires, or hog rings, as recommended by manufacturer of geotextile.

2.11 STABILIZED CONSTRUCTION ENTRANCE

- A. Construct a pad from stone 3 inches to 6 inches in size, placed at least 8 inches deep and not less than 50 feet long.
- B. Provide aggregate free of extraneous materials that may cause or contribute to track out.
- C. Place separation geotextile under the rock to prevent fine sediment from pumping up into the rock pad. See Article Geotextile for required geotextile properties.
- D. Use of constructed or constructed/manufactured steel plates with ribs (such as, shaker/rumble plates or corrugated steel plates) for entrance/exit access is allowable.

2.12 STREET CLEANING

- A. Use self-propelled pickup street sweeper(s). Mechanical broom sweepers are not allowed where environmental concerns exist about storm water pollution or air quality.

2.13 TEMPORARY PIPE SLOPE DRAIN

- A. Corrugated polyethylene drain pipe, couplings and fittings (up to 10-inch) meeting the requirements of AASHTO M252 Type C (corrugated both inside and outside) or Type S (corrugated outer wall and smooth inner liner).
 - 1. Maximum Pipe Size: 10 inches in diameter.

2.14 TEMPORARY SEDIMENT TRAP

- A. Temporary ponding area with a rock weir or perforated riser pipe at the outlet, formed by excavation or constructing a weir. Specified by Contractor with approval of Engineer.

PART 3 EXECUTION**3.01 PREPARATION**

- A. Include proposed stockpile areas and installation of temporary erosion control devices, ditches, or other facilities in Work phasing plans.
- B. Areas designated for Contractor's use during Project may be temporarily developed as specified to provide working, staging, and administrative areas. Include control of sediment from these areas in the TESC Plan.
- C. Check Dams: Install check dams as soon as construction will allow, or when designated by Engineer. Contractor may substitute a different check dam, in lieu of what is specified in the Contract, with approval of Engineer. Check dam is a temporary or permanent structure, built across a minor channel. Water shall not flow through check dam structure. Construct check dams to create a ponding area upstream of dam to allow pollutants to settle, with water from increased flows channeled over a spillway in check dam. Construct check dam to prevent erosion in area below spillway. Place check dams perpendicular to flow of water and install in accordance with the Drawings. Extend outer edges up sides of conveyance to prevent water from going around check dam. Provide check dams of sufficient height to maximize detention, without causing water to leave ditch. Place sandbags so that initial row makes tight contact with ditch line for length of dam. Stagger subsequent rows so center of bag is placed over space between bags on previous lift.
- D. Coir Log: Install coir logs in accordance with the Drawings.
- E. Compost Sock: Exercise care when installing compost socks to ensure method of installation minimizes disturbance of waterways and prevents sediment or pollutant discharge into waterbodies. Lace compost socks together, end-to-end, with coir rope to create a continuous length. Bury loose ends of continuous length 3 feet to 5 feet laterally into the bankslope. Install the upper surface of compost sock parallel to slope. Provide finished grades of a natural appearance with smooth transitions. Secure compost sock with wood stakes or live stakes of species as indicated on the Drawings. Drive stakes into place centered on top of compost sock and spaced 3 feet on center throughout length of sock.

- F. Erosion Control Blanket (Matting), Biodegradable: Temporary Erosion Control Blankets are used as an erosion prevention device and to enhance establishment of vegetation. Install erosion control blankets according to manufacturer's recommendations.
1. Erosion control blankets with an open area of 60 percent or greater may be installed prior to seeding and fertilizing. Install blankets with less than 60 percent open space immediately following seeding and fertilizing operation.
 2. Select erosion control blanket material for an area based on the intended function; slope or ditch stabilization and Site-specific factors including soil, slope gradient, rainfall, and flow exposure. Do not use erosion Control Blankets on slopes or in ditches that exceed manufacturer's recommendations.
 3. For permanent erosion control blanket, see Section 31 32 00, Soil Stabilization.
- G. High Visibility Fencing: Install high visibility fencing in accordance with the Drawings.
- H. Inlet Protection: Install inlet protection below or above, or as a prefabricated cover at each inlet grate, as shown on the Drawings. Install inlet protection devices prior to beginning clearing, grubbing or earthwork activities. Geotextile fabric used in prefabricated inlet protection devices must meet or exceed the requirements for Moderate Survivability and minimum filtration properties. When depth of accumulated sediment and debris reaches approximately one-half the height of an internal device or one-third the height of external device (or less when so specified by the manufacturers) or as designated by Engineer, remove deposits and stabilize onsite.
1. Below Inlet Gate:
 - a. Prefabricated units specifically designed for inlet protection.
 - b. Must remain securely attached to drainage structure when fully loaded with sediment and debris or at the maximum level of sediment and debris specified by manufacturer.
 2. Above Inlet Gate:
 - a. Devices may be silt fence, sandbags, or prefabricated units specifically designed for inlet protection.
 - b. Must remain securely in place around drainage structure under all conditions.
 3. Inlet Grate Cover:
 - a. Prefabricated units specifically designed for inlet protection and:
 - 1) Be a sewn geotextile fabric unit fitted to individual grate and completely enclosing grate.

- 2) Have built-in lifting devices to allow manual access of stormwater system.
 - 3) Use an orange monofilament geotextile fabric.
 - b. Check dams or functionally equivalent devices may be used as inlet protection devices with approval of Engineer.
- I. Mulch: Furnish, haul, and evenly apply at rates indicated and spread on seeded areas within 48 hours after seeding unless otherwise specified.
1. Distribute straw mulch material with an approved mulch spreader that uses forced air to blow mulch material on seeded areas.
 2. Apply wood strand mulch by hand or by straw blower on seeded areas.
 3. Hydraulically apply Short-Term Mulch at the rate of 2,500 pounds per acre. May be applied in one lift.
 4. Hydraulically apply Moderate-Term Mulch and Long-Term Mulch at the rate of 3,500 pounds per acre with no more than 2,000 pounds applied in any single lift. Mulch may be applied with seed and fertilizer in moist climates. In dry climates, apply seed and fertilizer in a single application followed by mulch application. Provide mulch suitable for application with a hydroseeder.
 5. Cover temporary seed applied outside application windows established in Section 32 92 00, Turf and Grasses, with a mulch containing either Moderate-Term Mulch or Long-Term Mulch, as designated by Engineer.
 6. Mulch areas not accessible by mulching equipment by approved hand methods.
- J. Outlet Protection: Provide outlet protection to prevent scour at outlets of ponds, pipes, ditches, or other conveyances.
- K. Plastic Covering: Use clear plastic covering to promote seed germination when seeding is performed outside of specified dates. Use black plastic covering for stockpiles or other areas where vegetative growth is unwanted. Place plastic with at least a 12-inch overlap of all seams. Install and maintain plastic cover to prevent water from cutting under the plastic and to prevent cover from blowing open in the wind.
- L. Sediment Control Barriers: Install sediment control barriers in accordance with TESC Plan or manufacturer's recommendations in the areas of clearing, grubbing, earthwork, or drainage prior to starting those activities. Maintain sediment control barriers until soils are stabilized.
- M. Seeding: See Section 32 92 00, Turf and Grasses.

- N. Silt (Sediment) Fence:
1. Silt fence shall be installed in accordance with the Drawings. When backup support is used, use steel wire with a maximum mesh spacing of 2 inches by 4 inches, or plastic mesh as resistant to ultraviolet radiation as the geotextile it supports. Provide wire or plastic mesh with strength equivalent to or greater than as required for unsupported geotextile (for example, 180 pounds grab tensile strength in the machine direction).
 2. Attach geotextile to posts and support system using staples, wire, or in accordance with manufacturer's recommendations. Geotextile shall be sewn together at the point of manufacture, or at a location approved by Engineer, to form geotextile lengths as required.
 3. Provide wood or steel support posts at sewn seams and overlaps and as shown on the Drawings and necessary to support fence.
 4. Wood Posts: Minimum dimensions of 1-1/4-inch by 1-1/4-inch by the minimum length shown on the Drawings.
 5. Steel Posts: Minimum weight of 0.90 lb/ft.
 6. When sediment deposits reach approximately one-third the height of the silt fence, remove and stabilize deposits.
- O. Stabilized Construction Entrance: Construct temporary stabilized construction entrance in accordance with the Drawings, prior to beginning any clearing, grubbing, earthwork, or excavation. When stabilized entrance no longer prevents track out of sediment or debris, either rehabilitate existing entrance to original condition or construct a new entrance.
- P. Street Cleaning: Use self-propelled pickup street sweepers whenever required by Engineer to prevent transport of sediment and other debris off Project Site. Provide street sweepers designed and operated to meet air quality standards. Street washing with water will require approval by Engineer. Intentional washing of sediment into storm sewers or drainage ways must not occur. Vacuuming or dry sweeping and material pickup must be used to cleanup released sediments.
- Q. Temporary Sediment Trap: Form trap by constructing a berm or by partial or complete excavation. Direct the discharge flow to a stabilized conveyance outlet or level spreader.
- R. Wood Chips and Wood Shavings: Install in accordance with the Drawings.

3.02 ADDITIONAL REQUIREMENTS

- A. Natural Buffer or Equivalent:
 - 1. Unless natural buffer between the Project Site and receiving waters has previously been eliminated by pre-existing development disturbances, comply with one of the following alternatives if stormwater from construction will discharge to surface water:
 - a. Provide a 50-foot, undisturbed natural buffer between construction disturbances and surface water.
 - b. Provide an undisturbed natural buffer that is less than 50 feet supplemented by additional erosion and sediment controls, which in combination, achieve a sediment load reduction that is equivalent to a 50-foot buffer.
 - c. If it is infeasible to provide an undisturbed natural buffer of any size, implement erosion and sediment controls that achieve a sediment load reduction that is equivalent to a 50-foot buffer.

3.03 MAINTENANCE

- A. The ESCP measures described in this specification are minimum requirements for anticipated Site conditions. During the construction period, upgrade these measures as needed to comply with all applicable local, state, and federal erosion and sediment control regulations.
- B. Maintain erosion and sediment control BMPs so they properly perform their function until Engineer determines they are no longer needed.
- C. Construction activities must avoid or minimize excavation and creation of bare ground during wet weather.
- D. The intentional washing of sediment into storm sewers or drainage ways must not occur. Vacuuming or dry sweeping and material pickup must be used to cleanup released sediments.
- E. Inspect BMPs in accordance with the schedule in the Construction Stormwater Discharge Permit(s) or as directed by Engineer.
- F. Complete an inspection report within 24 hours of an inspection. Each inspection report shall be signed and identify corrective actions. Document that corrective actions are performed within 7 days of identification. Keep a copy of all inspection reports at the Site or at an easily accessible location.

- G. Unless otherwise specified, remove deposits before the depth of accumulated sediment and debris reaches approximately height of BMP. Dispose of debris or contaminated sediment at approved locations. Clean sediments may be stabilized onsite using BMPs as approved by Engineer.
- H. Sediment Fence: Remove trapped sediment before it reaches one-third of the above ground fence height and before fence removal.
- I. Other Sediment Barriers (such as biobags): Remove sediment before it reaches 2 inches depth above ground height and before BMP removal.
- J. Catch Basins: Clean before retention capacity has been reduced by 50 percent.
- K. Sediment Basins and Sediment Traps: Remove trapped sediments before design capacity has been reduced by 50 percent and at completion of Project.
- L. Initiate repair or replacement of damaged erosion and sediment control BMPs immediately, and work completed by end of next work day. Significant replacement or repair must be completed within 7 days, unless infeasible.
- M. Within 24 hours, remediate any significant sediment that has left construction site. Investigate cause of the sediment release and implement steps to prevent a recurrence of discharge within same 24 hours. Perform in-stream cleanup of sediment according to applicable regulations.
- N. At end of each work day, stabilize or cover soil stockpiles or implement other BMPs to prevent discharges to surface waters or conveyance systems leading to surface waters.
- O. Temporarily stabilize soils at end of shift before holidays and weekends, if needed. Ensure soils are stable during rain events at all times of year.
- P. Initiate stabilization by no later than end of next work day after construction work in an area has stopped permanently or temporarily.
- Q. Within 14 days of initiating stabilization or as specified in permit, either seed or plant stabilized area (see Section 32 92 00, Turf and Grasses); or apply non-vegetative measures and cover all areas of exposed soil. Seed dry areas as soon as Site conditions allow. Ensure that vegetation covers at least 70 percent of stabilized area. In areas where Contractor's activities have compromised erosion control functions of existing grasses, overseed existing grass. Non-vegetative measures may include blown straw and a tackifier, loose straw, or an adequate covering of compost mulch. Complete initial stabilization within 7 days if storm water discharges to surface waters impaired for sediment or nutrients, or high quality waters.

- R. Provide permanent erosion control measures on all exposed areas. Do not remove temporary sediment control practices until permanent vegetation or other cover of exposed areas is established. However, do remove all temporary erosion control measures as exposed areas become stabilized, unless doing so conflicts with local requirements. Properly dispose of construction materials and waste, including sediment retained by temporary BMPs.

3.04 REMOVAL

- A. When Engineer determines that an erosion control BMP is no longer required, remove BMP and all associated hardware from the Project limits. When materials are biodegradable, Engineer may approve leaving temporary BMP in place.
- B. Permanently stabilize all bare and disturbed soil after removal of erosion and sediment control BMPs. Dress sediment deposits remaining after BMPs have been removed to conform to existing grade. Prepare and seed graded area. If installation and use of erosion control BMPs have compacted or otherwise rendered soil inhospitable to plant growth, such as construction entrances, take measures to rehabilitate soil to facilitate plant growth. This may include, but is not limited to, ripping the soil, incorporating soil amendments, or seeding with specified seed.

END OF SECTION

**SECTION 01 61 00
COMMON PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock, and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 DESIGN REQUIREMENTS

- A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of the 2012 International Building Code (IBC) as amended by the State of Tennessee.
- B. For environmental loads including Wind, Snow, and Seismic, see Design Criteria on Drawing 001-G-1005.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 865 feet above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 0 degrees F to 100 degrees F.

1.04 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - 1. Furnish as required by individual Specifications.
 - 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 - 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 4. Deliver materials to Site.
 - 5. Notify Engineer upon arrival for transfer of materials.
 - 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Engineer of anticipated date and place of equipment arrival.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.05 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.06 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01 50 00, Temporary Facilities and Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to ensure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.

- E. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.

- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction (AHJ):
 - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 - 2. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.
- J. Equipment Finish:
 - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with gray finish as approved by Owner.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.
- M. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the

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maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible; oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

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 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Engineer.
- F. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.

- G. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.04 FIELD FINISHING

- A. In accordance with Section 09 90 00, Painting and Coating, and individual Specification sections.

3.05 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.06 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.07 SUPPLEMENTS

- A. The supplement listed below, following “End of Section”, is part of this specification.
 - 1. Form: Manufacturer’s Certificate of Compliance.

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)

**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. Wastewater Grinder Pump System (E-One Simplex):
 - 1. Quantity: One.
 - 2. New Operations Building.

1.03 INFORMATION 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 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.

1.05 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.

1.06 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.

1.07 EXTRA MATERIALS

- A. Unless otherwise specified, Owner will take acceptance of, and be responsible for storing associated extra materials and special tools upon delivery.

1.08 PREINSTALLATION MEETING

- A. Arrange and attend a preinstallation meeting with the Engineer and Owner 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. Provide foundation pads for Owner-furnished products as shown. Verify exact dimensions and configuration of all pads, including penetrations, with Owner-furnished product shop drawings.
- D. 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.
- E. Mechanical and electrical equipment shall be properly aligned, plumb and level, with no stresses on connecting piping or conduit.
- F. Verify direction of motor rotation before starting equipment drives.
- G. Verify operability and safety of electrical system needed to operate equipment. Check electrical system for continuity, phasing, grounding, and proper functions.

H. Pump Installation:

1. Level base by means of steel wedges (steelplates and steel shims). Wedge taper not greater than 1/4 inch per foot. Use double wedges to provide level bearing surface for the pump and driver base. Accomplish wedging so there is no change of level or springing of baseplate when anchor bolts are tightened.
2. Adjust pump assemblies so driving units are properly aligned, plumb, and level with driven units and all interconnecting shafts and couplings. Do not compensate for misalignment by use of flexible couplings.
3. After pump and driver have been set in position, aligned, and shimmed to proper elevation, grout space between bottom of baseplate and concrete foundation with a poured, nonshrinking grout of the proper category, as specified in Section 03 62 00, Grouting. Remove wedges after grout is set and pack void with grout.
4. Connect suction and discharge piping without imposing strain to pump flanges. Pump discharge and suction flexible couplings or bellows shall not be considered to compensate for misalignment.
5. Pipe pump drain(s) to hub drain or scupper.

3.02 FIELD FINISHING

A. Products will be delivered with prime and finish coat(s) applied.

1. Finish coat as specified in Section 09 90 00, Painting and Coating.
2. Touchup or repair damage to coatings resulting from unloading, storage, installation, testing, and startup.
3. If finish coats are damaged extensively after transfer, completely repaint.
4. Touchup, repair, or complete repainting shall match color of original paint, and shall be fully compatible with applied primers and finish.

3.03 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.

3.04 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.
 - 2. Performance 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. **[A: 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. **[A: 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 are 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 **[A: Owner] [B: and] [C: 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: **[A: Submit Instructional Manual Formatted data not less than 30 days prior to [B: installation of equipment or system [C: equipment or system field functional testing].] [D: Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.]**
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit **[A: at least 15 days prior to request for final inspection] [B:]**.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary [**A: and final**] data in the form of an instructional manual. [**B: Prepare final data [C: in data compilation format.] [D: 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. [**A: Identity of general subject matter covered in manual.]**
[**B: Identity of equipment number and Specification section.]**
 - 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. [A: Data Compilation Format:

1. **Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.**
2. **Each set shall consist of the following:**
 - a. **Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.**
 - b. **Cover: Identify each volume with typed or printed title “OPERATION AND MAINTENANCE DATA, VOLUME NO. ___ OF ___”, and list:**
 - 1) **Project title.**
 - 2) **Contractor’s name, address, and telephone number.**
 - 3) **If entire volume covers equipment or system provided by one Supplier include the following:**
 - a) **Identity of general subject matter covered in manual.**
 - b) **Identity of equipment number and Specification section.**
 - c. **Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.**
 - d. **Table of contents neatly typewritten, arranged in a systematic order:**
 - 1) **Include list of each product, indexed to content of each volume.**
 - 2) **Designate system or equipment for which it is intended.**
 - 3) **Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.**
 - e. **Section Dividers:**
 - 1) **Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.**
 - 2) **Fly-Leaf:**
 - a) **For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.**
 - b) **List with Each Product:**
 - (1) **Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.**
 - (2) **Identify area of responsibility of each.**
 - (3) **Provide local source of supply for parts and replacement.**
 - c) **Identity of separate structure as applicable.**

- f. **Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.]**

D. **[A: Electronic Media Format:**

1. **[B: 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.]**
2. **[C: Manufacturers' standard electronic format.]**

1.05 SUBMITTALS

A. Informational:

1. Data Outline: Submit **[A: two] [B:]** copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data:
 - a. Submit **[C: two] [D: 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) **[E: 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 **[F: two] [G:]** copies revised in accordance with Engineer's comments.
3. Final Data: Submit **[H: two] [I:]** 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 sub-units.
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.

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2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENTS

- A. The supplements listed below, following “End of Section”, are part of this Specification.
 1. Forms: 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.

**SECTION 01 88 15
ANCHORAGE AND BRACING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the ICC 2012 International Building Code (IBC), for seismic, wind, gravity, soil, and operational loads.

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) 360, Specification for Structural Steel Buildings.
 - 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. National Fire Protection Association (NFPA): 13, Standard for the Installation of Sprinkler Systems.

1.03 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.0.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. General:

1. Anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of Tennessee.
2. Design anchorage into concrete including embedment in accordance with ACI 318-11, Appendix D (or other industry standard approved by Engineer), and Project Specifications.
 - a. Unless otherwise noted, design for cracked concrete condition.
3. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
4. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
5. Anchor and brace piping and ductwork, whether exempt or not exempt for this section, so that lateral or vertical displacement does not result in damage or failure to essential architectural, mechanical, or electrical equipment.
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. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
8. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
9. Design anchorage and bracing for:
 - a. Equipment and components that weigh more than 400 pounds and have center of mass located 4 feet or less above adjacent finished floor.
 - b. Equipment weighing more than 20 pounds that has center of mass located more than 4 feet above adjacent finished floor.
 - c. Mechanical and electrical components that are not provided with flexible connections between components and associated ductwork, piping, or conduit.
 - d. Distribution systems that weigh more than 5 pounds per foot that have center of mass located more than 4 feet above adjacent finished floor.

10. Design seismic anchorage and bracing for Designated Seismic Systems regardless of weight or mounting height.
 - a. Component Important Factor:
 - 1) $I_p = 1.0$, unless noted otherwise.
 - 2) I_p shall be taken as 1.5 if any of the following conditions apply:
 - a) Component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems and egress stairways.
 - b) Component contains hazardous materials.
 - 3) Refer to Section 01 45 36, Equipment Seismic Certification, for list of designated components which I_p equals 1.5.
11. For components exempted from design requirements of this section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.

B. Design Loads:

1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
2. Wind: Design anchorage and bracing for wind criteria provided on General Structural Notes on Drawings for exposed architectural components and exterior and wind-exposed mechanical and electrical equipment. Alternately, manufacturer certification may be provided for components such as roofing and flashing to verify attachments meet Project-specific design criteria.
3. Operational:
 - a. For loading supplied by equipment manufacturer for IBC required load cases.
 - b. Loads may include equipment vibration, torque, thermal effects, effects of internal contents (weight and sloshing), water hammer, and other load-inducing conditions.
 - c. Locate braces to minimize vibration to or movement of structure.
 - d. For vibrating loads, use anchors meeting requirements of Section 05 50 00, Metal Fabrications or Section 05 05 19, Post-Installed Anchors, for anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.
4. Seismic:
 - a. In accordance with 2012 IBC, Section 1613, and Chapter 13 of ASCE 7.
 - b. Design anchorage and bracing for design criteria listed on General Structural Notes on Drawings.
 - c. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2, or IBC Section 1905.1.9 as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

1. Nonstructural Components: Design as nonbuilding structures for components with weights greater than or equal to 25 percent of effective seismic weight of overall structure.
2. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component $I_p = 1.5$.
3. The following are exempt from requirements 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:
 - a. Furniture, except storage cabinets and bookshelves over 6 feet tall.
 - b. Temporary or movable equipment.
4. Fire protection sprinkler systems designed and constructed in accordance with NFPA 13 shall be considered to meet requirements of Chapter 13 of ASCE 7.
5. Provide support drawings and calculations for electrical distribution components if any of the following conditions apply:
 - a. Conduit diameter is greater than 2.5-inch trade size.
 - b. Total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
6. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph require the same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
7. Other seismic design and detailing information identified in ASCE 7, Chapter 13, is required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.
 - b. Manufacturers' engineered seismic and non-seismic hardware product data.
 - c. Attachment assemblies' drawings including seismic attachments; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.

- d. List of existing architectural, mechanical, and electrical equipment or components to be modified in Project requiring Contractor-designed anchorage and bracing in final retrofitted condition.
- e. Drawings for seismic attachment assemblies include connection hardware, braces, and anchors (or anchor bolts) for modified, nonexempt existing components, equipment, and systems where a combination of new and existing systems or components' final condition would require anchorage or bracing under this specification for new equipment.
- f. Submittal will be rejected if proposed anchorage method would create excessive stress to supporting member. Revise anchorages and strengthen structural support to eliminate overstressed condition.

B. Informational Submittals:

- 1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil or structural engineer registered in the State of Tennessee.
- 2. Manufacturer's hardware installation requirements.

C. Deferred Submittals:

- 1. Submitted seismic anchorage drawings and calculations for Designated Seismic Systems are identified as IBC deferred submittals and will be submitted to and must be accepted by AHJ prior to installation of component, equipment, or distribution system.
- 2. Submit deferred Action Submittals such as Shop Drawings with supporting deferred informational submittals such as calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.

1.06 SOURCE QUALITY CONTROL

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections in Supplement located at the end of Section 01 45 33, Special Inspection, Observation, and Testing, and Section 01 45 33, Special Inspection, Observation, and Testing.

- B. Provide all other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16.13, Contractor Quality Control.
- C. Provide Source Quality Control for welding and hot-dip galvanizing of anchors in accordance with Section 05 50 00, Metal Fabrications.

PART 2 PRODUCTS

2.01 GENERAL

- A. Design and construct attachments and supports transferring seismic and non-seismic loads to structure of materials and products suitable for application and in accordance with design criteria shown on Drawings and nationally recognized standards.
- B. Provide anchor bolts for anchorage of equipment to concrete or masonry in accordance with Section 05 50 00, Metal Fabrications. Provide anchor bolts of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed concrete and masonry anchors for anchorage of equipment to concrete or masonry in accordance with Section 05 05 19, Post-Installed Anchors. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- D. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for nonvibration isolated mechanical equipment rated over 10 horsepower.

PART 3 EXECUTION

3.01 GENERAL

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.
- B. Design, provide, and install overall seismic anchorage system to provide restraint in all directions, including vertical, for each component or system so anchored.

- C. Provide snubbers in each horizontal direction and vertical restraints for components mounted on vibration isolation systems where required to resist overturning.
- D. Provide piping anchorage that maintains design flexibility and expansion capabilities at flexible connections and expansion joints.
 - 1. Piping and ductwork suspended more than 12 inches below supporting structure shall be braced for seismic effects to avoid significant bending of hangers and their attachments, unless high- or limited-] deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet or weigh 17 pounds per foot or less.
- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

3.02 INSTALLATION

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. In accordance with Section 05 50 00, Metal Fabrications and Section 05 05 19, Post-Installed Anchors.
- B. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.

- C. Provide any other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16.13, Contractor Quality Control.

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 sections.
- D. Unit Process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as [A:] [B:] and [C:].
- 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.
 - 4. **[A: Furnish assistance of manufacturer's representative(s) for Owner-furnished products, as specified in Section 01 64 00, Owner-Furnished Products.]**
 - 5. **[B: Make available spare parts, special tools, and operation and maintenance information for Owner-furnished products.]**

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 **[A: Engineer]** **[B:]** 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 **[C: , including items to be furnished by Owner]**.
 - 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 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 **[A: be as chosen by Contractor to meet schedule requirements.] [B: be in the following order:]**
 1. **[C: .]**
 2. **[D: .]**
- 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 **[A: 5] [B:]** 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 for more than **[A: 2] [B:]** consecutive hours.
 3. Failure of any critical equipment or unit process that is not satisfactorily corrected within **[C: 5] [D:]** hours after failure.
 4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within **[E: 8] [F:]** hours after failure.
 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 [**A: including its computer system**] [**B: , until all unit processes are operable and under control of computer system**].
- E. Certify, on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic [**A: and computerized**] 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 02 41 01
ELECTRIC UTILITIES DEMOLITION**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Informational Submittals:
 - 1. Subschedule of **[A: phased]** demolition.
 - 2. Methods of demolition and equipment proposed to remove each assembly unit.
 - 3. Copies of any authorizations and permits required to perform the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 ASSEMBLY UNITS

- A. Remove for **[A: future]** reuse by **[B: Owner]** **[C: Contractor]** **[D:]** prior to commencement of **[E: demolition]** **[F: construction]**.
- B. Remove from existing lines, disassemble into material items, and transport materials to **[A: Owner's]** **[B: Contractor's]** **[C: warehouse]** **[D:]**.
- C. **[A: Perform delivery and off-loading to Owner's premises in presence of Owner's representative. Notify Owner [B: 2] [C:] days in advance of removal and relocation.]**

3.02 POLES

- A. Do not remove ground wire or pole numbering attached to pole.
- B. Remove pole and backfill, tamp, and mound holes, unless holes will be reused.

3.03 POLE-TOP ASSEMBLIES

- A. Remove assembly. Resag and retie conductors when existing assembly will be replaced and when existing conductor will be reused.
- B. Included: Holding and handling of main line, tap conductors, angles, and dead ends.

CITY OF WHITE HOUSE

3.04 CONDUCTOR UNIT

- A. Remove conductor or cable without cutting and reel for reuse by Owner; measure in 1,000-foot increments. **[A: Owner will furnish reels.]**
- B. Retain as Salvage: Jumpers, tie wire, armor rods, connectors, and other conductor accessories.

3.05 GUYS

- A. **[A: .]**

3.06 ANCHORS

- A. Remove anchor rods; leave anchors in ground. If rod cannot be unscrewed, cut off rod end at least 18 inches below surrounding ground surface elevation.

3.07 TRANSFORMERS

- A. **[A: .]**

3.08 SECONDARY UNITS

- A. Remove assembly and untie, resag, and retie secondary conductor or cables when existing item will be reused.

3.09 SERVICE UNITS

- A. Remove assembly and untie, resag, and retie secondary conductor or cables when existing service conductor or cable will be reused.

3.10 OTHER ASSEMBLIES

<u>Unit</u>	<u>Description</u>
[A:]	[B:]

END OF SECTION

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.
 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 steel reinforcement. 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. Samples: Mesh reinforcement and mesh anchor.
- 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 61 00, Common Product Requirements, that proposed repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces that are exposed to weather.
 - b. Mortar Manufacturer's Certificate of Proper Installation.
4. Statements of Qualification:
 - a. Repair mortar system applicator.
 - b. Repair mortar system manufacturer's representative.
 - c. H: Independent Testing Laboratory.
5. Repair mortar system manufacturer's proposed modified test procedures for ASTM C109/C109M, ASTM C882/C882M, and ASTM C157/C157M test methods.
6. Field and laboratory test reports.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 1. Repair Mortar System Applicator:
 2. Repair Mortar System Manufacturer's Representative: Knowledgeable and experienced on technical data and application requirements for specified products.
- B. Where Required by Engineer: Demonstration Mockup for Repair System C – Polymer Modified Repair Mortar System:
 1. 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 areas 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: Take core samples from demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.

C. Pre-repair 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 REPAIR 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. Drying Shrinkage, ASTM C596 at 28 Days: 0.12 percent maximum. Not required for small repair areas approximately 1 square foot in area or less.
6. Freeze Thaw Resistance, ASTM C666/C666M, at 300 Cycles: 90 percent RDM.

C. Manufacturers and Products:

1. Sika Corp., Lyndhurst, NJ; SikaTop 123 PLUS.
2. Euclid Chemical Co., Cleveland, OH; DuralTop Gel.

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 Steel Reinforcement: Per Section 03 21 00, Steel Reinforcement.

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.
 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 and from same manufacturer as the repair system used.

B. Manufacturers and Products:

1. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
2. Euclid Chemical Co., Cleveland, OH: Dural Prep AC.

2.05 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.06 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 APPLICATION

A. General:

1. Repair System: Small and limited areas and number of repair areas.

3.03 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 because of 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 steel reinforcement. Roughen polished saw-cut edge by high-pressure water blasting.
- G. Remove concrete adjacent to steel reinforcement to a minimum of 1-inch clearance around steel reinforcement for application and bonding of new repair mortar to circumference of exposed steel reinforcement if one or more of the following surface conditions exist:
 - 1. 50 percent or more of circumference around steel reinforcement is exposed during concrete removal.
 - 2. 25 percent or more of circumference around steel reinforcement 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 steel reinforcement has been destroyed or has deteriorated as determined by Engineer.
- H. Clean exposed steel reinforcement 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.

3.04 PROTECTION

- A. If cementitious coating or bonding agent is used, protect adjacent surfaces from over application. Promptly remove bonding agent applied beyond repair area.

3.05 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR PLACEMENT

- 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 or low-pressure spray and trowel to specified surface finish, in accordance with requirements of repair material’s printed instructions.
- D. Finish repair mortar to smooth even surface to match adjacent concrete surface.
- E. Cure as specified in Article Curing, and in accordance with manufacturer’s printed instructions.

3.06 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, continue water fog curing after repair mortar system application and when curing will not cause erosion of mortar.
- D. Continuously water fog 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.

3.07 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.

D. Testing laboratory retained by Owner will provide the following:

1. Compression Strength Test:
 - a. Testing will follow a “modified” ASTM C109/C109M.
 - b. A minimum of three production samples of mixed material will be obtained from each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days.
 - c. Record location where repair mortar is being applied at time production samples are obtained.
2. Direct Tension Bond Test:
 - a. Two core samples will be obtained and tested for each 2,000 square feet of repair work.

- b. Cores will be 2-1/2-inch or 3-inch diameter to a total depth equal to at least 2.5 times repair mortar thickness.
 - c. Bond Strength of Repair Mortar to Substrate Concrete: 200 psi minimum in direct tension without failure or movement.
 - d. Record locations of Bond Tests on each type of applied repair mortar tested.
- E. Retest mortar repairs that do not meet test requirements.
- F. Repair and fill holes using same repair mortar where core samples have been removed.

3.08 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.

3.09 MANUFACTURER'S SERVICES

- A. Provide repair mortar system manufacturer's representative at Site to review acceptability of surface preparation, mixing and installation assistance, training of repair mortar system applicators,] inspection, and Certification of Proper Installation.

3.10 CLEANING

- A. 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 steel reinforcement. 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 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 61 00, Common Product Requirements, that proposed repair mortar systems meet requirements of ASTM C928/C928M.
 - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on horizontal surfaces that are exposed to weather, or receive traffic.
 - c. Mortar Manufacturer's Certificate of Proper Installation.
 - d. Confirmation epoxy resin bonding agents conform to ASTM C882/C882M.
4. Statements of Qualification:
 - a. Repair mortar system applicator.
 - b. Independent Testing Laboratory.
5. Field and laboratory test results.

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: Knowledgeable and experienced on technical data and application requirements for specified products.

B. Pre-repair 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 REPAIR MORTAR SYSTEM NO. 5—POLYMER MODIFIED REPAIR MORTAR

- A. One or two-component, fast-setting, polymer modified cementitious based repair mortar system.
- B. Compressive Strength, ASTM C109/C109M:
 1. 1 Day: 2,500 psi minimum.
 2. 7 Days: 5,000 psi minimum.
 3. 28 Days: 7,000 psi minimum.
- C. Flexural Strength, ASTM C348 at 28 Days: 1,500 psi minimum.
- D. Slant Shear Bond Strength, ASTM C882/C882M Modified at 28 Days: 2,000 psi minimum.
- E. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.
- F. Abrasion Resistance Depth of Wear, ASTM C779/C779M, Procedure A, at 60 Minutes: 0.033 inch maximum.

- G. Drying Shrinkage, ASTM C157/C157M Modified, at 28 Days: 0.09 percent maximum.
- H. Rapid Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 28 Days: Under 850 coulombs maximum.
- I. Manufacturers and Products:
 - 1. Euclid Chemical Co., Cleveland, OH; Duraltop Flowable Mortar.
 - 2. Sika Corp., Lyndhurst, NJ; SikaTop 111 PLUS.

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

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.
 - 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.
 - 3. Bonding agent shall not produce a vapor barrier.
 - 4. Compatible with, and from same manufacturer as the, repair mortar system used.
- B. Manufacturers and Products:
 - 1. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
 - 2. Euclid Chemical Co., Cleveland, OH; Dural Prep AC.

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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. Compatible with, and from same manufacturer as the, repair mortar system used.
- H. Manufacturers and Products:
 - 1. Sika Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod LPL.
 - 2. Euclid Chemical Co., Cleveland, OH; Eucofloor Epoxy Primer.

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 APPLICATION

- A. General:
 - 1. Repair Mortar System No. 5:
 - a. Patches and Overlays: 1/4 inch to 3 inches thick.
 - b. Return to service for foot traffic in 4 hours; wheel traffic in 7 days.
 - c. Working Time: 30 minutes at 70 degrees F.
 - d. Application Temperature Range: 45 degrees F to 90 degrees F.

3.03 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 because of 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 featheredges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water blasting.
- G. Remove concrete adjacent to steel reinforcement to a minimum of 1-inch clearance around steel reinforcement for application and bonding of new repair mortar to entire circumference of exposed steel reinforcement if one or more of the following surface conditions exist:
 - 1. 50 percent or more of circumference around steel reinforcement is exposed during concrete removal.
 - 2. 25 percent or more of circumference around steel reinforcement 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 steel reinforcement has been destroyed or has deteriorated as determined by Engineer.

- H. Clean exposed steel reinforcement 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. Preparation of Substrate Concrete Surface in Areas to Receive Repair Mortar System No. 5: 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.

3.04 PLACEMENT

- A. Repair Mortar System No. 5:
 - 1. Remove standing and free water from prepared area.
 - 2. Scrub repair mortar into 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. Bonding agent may be in lieu of scrub coat, in accordance with repair mortar manufacturers' written instructions.
 - 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.

3.05 FINISHING

- A. Spray full strength evaporation retardant on fresh concrete to prevent rapid drying during hot and windy weather.

3.06 CURING

- A. Repair Mortar System No. 5: Apply curing compound in accordance with Section 03 39 00, Concrete Curing.

3.07 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.

D. Testing laboratory retained by Owner will provide the following:

1. Compression Strength Test:
 - a. Testing will follow a “modified” ASTM C109/C109M.
 - b. A minimum of three production samples of mixed material will be obtained from each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days.
 - c. Record location where repair mortar is being applied at time production samples are obtained.
2. Direct Tension Bond Test:
 - a. Two core samples will be obtained and tested for each 2,000 square feet of repair work.
 - b. Cores will be 2-1/2-inch or 3-inch diameter to a total depth equal to at least 2.5 times repair mortar thickness.
 - c. Bond Strength of Repair Mortar to Substrate Concrete: 200 psi minimum in direct tension without failure or movement.
 - d. Record locations of bond tests on each type of applied repair mortar tested.

- E. Retest mortar repairs that do not meet test requirements.
- F. Repair and fill holes using same repair mortar where core samples have been removed.

3.08 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.

3.09 MANUFACTURERS' SERVICES

- A. Provide mortar manufacturer's representative at Site to advice on product selection, review acceptability of surface preparation, mixing and installation assistance, inspection, and Certification of Proper Installation.

3.10 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, Specification for Tolerances for Concrete Construction and Materials.
 - a. 350.5, Specifications for Environmental Concrete Structures.
350, Code Requirements for Environmental Engineering Concrete Structures.

1.02 DEFINITIONS

- A. Defective Areas: See definition in Section 03 30 00, Cast-in-Place Concrete.
- B. Exposed Concrete: See definition in Section 03 30 00, Cast-in-Place Concrete.

1.03 DESIGN REQUIREMENTS

- A. Design formwork in accordance with ACI 350.5 and ACI 350 to provide concrete finishes specified in Section 03 30 00, Cast-in-Place Concrete.
- B. Unless otherwise specified, limit deflection of facing materials for concrete surfaces to comply with ACI 350.5. Limit deflection of facing materials to comply with tolerance limits established by Contract Documents and with tolerances required by equipment manufacturers. Coordinate tolerance requirements with equipment manufacturers.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Form release agent.
 - b. Form ties.
 - c. Products to be used for sealing tie holes.
- B. Informational Submittals:
 - 1. Statement of qualifications for formwork designer.
 - 2. Statement of qualifications for form liner designer.

3. Statement of qualifications for form liner installer.
4. Reshoring and Backshoring Procedure
5. Shop Drawings for Formwork, Shoring, Reshoring, and Backshoring:
 - a. Shop Drawings shall be signed and sealed by a licensed professional engineer in the state of the Project.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Formwork Designer: Formwork, falsework, and shoring design shall be designed by an engineer licensed in the state of Project.

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.
2. Where steel forms are used, treat steel surfaces to prevent rusting using products approved for use on steel forms.
3. Circular Structure:
 - a. Wall forms shall conform to circular shape of structure.
 - b. Straight panels may be substituted for circular forms provided panels do not exceed 2 feet in horizontal width and angular deflection is no greater than 3-1/2 degrees per joint.

B. Column Forms:

1. Rectangular Columns: As specified for walls.
2. Circular Columns: Fabricated steel or fiber-reinforced plastic with bolted sections or spirally wound laminated fiber form. Internally treat with release agent for full height of column.

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.

2.02 ACCESSORIES

A. Form Release Agent:

1. Material:
 - a. Shall not bond with, stain, or adversely affect concrete surfaces.
 - b. Shall not impair subsequent treatments of concrete surfaces when applied to forms.
 - c. Ready-to-use water based material formulated to reduce or eliminate surface imperfections.
 - d. Contain no mineral oil or organic solvents.
2. Manufacturers and Products: Not for surfaces exposed to potable water.
 - a. BASF, Shakopee, MN; MBT MasterFinish RL 211.
 - b. Cresset Chemical Company; Crete-Lease 20-VOC-Xtra.

B. 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.

C. Form Snap-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.

D. Form Snap-Ties with Water Stop:

1. 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 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.

E. Through-Bolts:

1. At Contractor's option, may be used as alternate to form snap-tie or form snap-tie with water stop.
2. Tapered minimum 1-inch diameter at smallest end.
3. Plug for Through-Bolt Tie Holes:
 - a. Design and size of plug to allow insertion and compression of plug to form impermeable seal at center of member.
 - b. Manufacturers and Products:
 - 1) Greenstreak Group, Inc., St Louis, MO; X-Plug.

PART 3 EXECUTION

3.01 FORM SURFACE PREPARATION

- A. Prior to coating surface, 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.
- B. Exposed Wood Forms in Contact with Concrete: Apply form release agent as recommended by manufacturer.
- C. Steel Forms: Apply form release agent as soon as they are cleaned to prevent discoloration of concrete from rust.

3.02 ERECTION

- A. General: In accordance with ACI 301, unless otherwise specified.
- B. Beveled Edges (Chamfer):
 1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
 2. Where beveled edges on existing adjacent 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 uninterrupted uniform pattern.
 3. Inspect form surfaces prior to installation to ensure conformance with specified tolerances.

D. Form Tolerances:

1. Provide forms in accordance with ACI 117 and ACI 318, and the following tolerances for finishes specified:
 - a. See the Schedule of Concrete Finishes in Section 03 30 00, Cast-in-Place Concrete, for beam, column, and wall types related to required form tolerances.
 - b. Wall Tolerances:
 - 1) Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified. Coordinate equipment manufacturer's wall tolerance requirements for purchased equipment and use more stringent of the manufacturer's and the specified tolerances.
 - 2) Wall Type W-A:
 - a) Plumb within 1/4 inch in 10 feet or within 1 inch from top to bottom for walls over 40 feet high.
 - b) Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in all directions.
 - 3) Wall Type W-B:
 - a) Plumb within 1/8 inch in 10 feet or within 1/2 inch from top to bottom for walls over 40 feet high.
 - b) Depressions in Wall Surface: Maximum 1/8 inch when 10-foot straightedge is placed on high points in all directions.
 - 4) Thickness: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - 5) Form Offset: Between adjacent pieces of formwork, facing material shall not exceed 1/4 inch.
 - c. Beams and Columns Tolerances:
 - 1) Exposed Straight Horizontal and Vertical Surfaces: Flat planes within tolerances specified.
 - 2) Lateral Alignment:
 - a) Centerlines shall be within plus or minus 1/2 inch from dimensions shown.
 - b) At intersections, centerlines shall intersect within plus or minus 1/2 inch of dimensions shown.
 - 3) Beam Type B-A:
 - a) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - b) 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.

- 4) Column Type C-A:
 - a) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - b) 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, Chapter 6, and at such time as concrete has reached compressive strength equal to 80 percent of specified 28-day compressive strength as determined by test cylinders.
- C. Form Ties: Remove conical inserts or through bolts and plug holes as specified in Section 03 30 00, Cast-in-Place Concrete.

3.04 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

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 Carbon-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. C920, Specification for Elastomeric Joint Sealants.
 - e. D226, Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - f. D227, Specification for Coal-Tar Saturated Organic Felt Used in Roofing and Waterproofing.
 - g. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - h. D1056, Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
 - i. D1171, Standard Guide for Evaluating Nonwoven Fabrics.
 - j. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - k. D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - l. D2240, Standard Test Method for Rubber Property – Durometer Hardness.

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 Joints, Expansion Joints and Control Joints: Layout and location for each type. Include joints locations shown on Drawings, additional required joint locations and any proposed alternate locations.
2. Product Data:
 - a. Waterstops.
 - b. Bond breaker.
 - c. Premolded joint fillers.
 - d. Pourable joint fillers.
 - e. Preformed control joints.
 - f. Roofing felt.
 - g. Accessories not specified in other sections.
3. Samples: PVC waterstop splice, joint, and fabricated cross of each size, shape, and fitting of waterstop.

B. Informational Submittals:

1. Certification:
 - a. Joint Filler(s) for Aeration or Oxygenation Basins: Certificate of conformance for oxygen content provided in facility process.
 - b. Letter stating compatibility between liquids being contained and materials used for:
 - 1) Waterstops.
 - 2) Joint fillers.
 - c. Manufacturer's application instructions for:
 - 1) Bonding agent.
 - 2) Bond breaker.
2. Manufacturer's written instructions for product shipment, storage, handling, installation/application, and repair for:
 - a. Waterstops.
 - b. Bond breaker.
 - c. Bonding agent.
 - d. Premolded joint fillers.
 - e. Pourable joint fillers (sealant proportions not required as products used only as a filler).
 - f. Preformed control joints.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site: Verify delivered materials are in accordance with Specifications, regulatory agencies, 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 or as required by Manufacturer.

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 Required in All Expansion, Contraction, and Control Joints: 6 inches wide or 9 inches wide with center bulb and parallel longitudinal ribs or protrusions on each side of strip center, as indicated on Drawings.
- F. Type Required in Construction Joints: Flat ribbed, 6 inches wide or 9 inches wide with parallel longitudinal ribs or protrusions on each side of strip center. Center bulb is optional.
- G. Corrugated or tapered type waterstops are not acceptable.
- H. Thickness: Constant from bulb edge (or center of waterstop) to outside stop edge.
- I. Minimum Weight per Foot of Waterstop:
 - 1. 0.50 pound for 3/16 inch by 4 inches.
 - 2. 1.60 pounds for 3/8 inch by 6 inches.
 - 3. 2.30 pounds for 3/8 inch by 9 inches.

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- J. Factory Fabrications: Use only factory fabrications for intersections, transitions, and changes of direction.
- K. Manufacturers and Products for Center Bulb Type:
 - 1. Use same manufacturers for flat ribbed profile:
 - a. Vinylex Corp., St Louis, MO.; No. RB638H (6 inches by 3/8 inch) and No. RB938H (9 inches by 3/8 inch).
 - b. Greenstreak, St. Louis, MO; Style No. 702, (4 inches by 3/16 inch), Style 732 (6 inches by 3/8 inch) and Style 735 (9 inches by 3/8 inch).
 - c. Durajoint, Garrettsville, OH.; Type 3, (4 inches by 3/16 inch), Type 9 (6 inches by 3/8 inch), and Type 10 (9 inches by 3/8 inch).
 - d. BoMetals, Carrollton, GA.: No. RCB-4316LB (4 inches by 3/16 inch), No. RCB-638LB (6 inches by 3/8 inch) and No. RCB-938NT (9 inches by 3/8 inch).
 - e. Dacon Plastics LLC, Jacksonville, TX; No. RCB11, (4 inches by 3/16 inch), No. RCB17 (6 inches by 3/8 inch) and No. RCB18 (9 inches by 3/8 inch).

2.02 WIRE LOOPED PLASTIC WATERSTOP

- A. Furnish as alternative to plastic waterstops.
- B. Same material and geometry as plastic waterstops.
- C. Furnish with continuous galvanized wire looping at edge for convenience in positioning and securing stop in place in forms.
- D. Manufacturer and Product: Paul Murphy Plastics, Roseville, MI; “Wire Stop Waterstop”; geometry numbers ACR 6380, ACR 9380, as shown on Paul Murphy Plastics Co. Drawing No. CCP-120-12M.

2.03 HYDROPHILIC WATERSTOP

- A. For use at construction joints only, where new concrete is placed against existing concrete and as shown on Drawings.
- B. Material shall be a nonbentonite hydrophilic rubber compound.
- C. Manufacturers and Products:
 - 1. Greenstreak Plastic Products, St. Louis, MO; Hydrotite CJ-1020-2K with Leakmaster LV-1 adhesive and sealant.
 - 2. Adeka Ultra Seal, JLM Associates, Spearfish, SD; MC-2010M with 3M-2141 adhesive and P-201 sealant.

2.04 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 bond prevention material as specified in Section 03 30 00, Cast-in-Place Concrete, except where bond breaker tape is specifically called for on Drawings.

2.05 PREMOLDED JOINT FILLER

- A. Bituminous Type: ASTM D994 or ASTM D1751.
- B. Sponge Rubber:
 - 1. Neoprene, closed-cell, expanded; ASTM D1056, Type 2C5, with compression deflection, 25 percent deflection (limits), 119 kPa to 168 kPa (17 psi to 24 psi) minimum. Use in joints for potable and nonpotable water containment structures.
 - 2. Manufacturer and Product: Monmouth Rubber and Plastics, Corp, Long Branch, NJ; Durafoam DK5151.

2.06 BUILDING PREFORMED CONTROL JOINT

- A. One-Piece, Flexible, Polyvinyl Chloride Joint Former:
 - 1. Manufacturer and Product: WR Meadows, Inc., Hampshire, IL; Keyway.
- B. One-Piece Galvanized Steel Strip with Preformed Groove:
 - 1. Manufacturer and Product: BoMetals, Inc. Carrollton, GA; QuickKey or ProKey Joint.
- C. Furnish in full-length, unspliced pieces.

2.07 POURABLE JOINT FILLERS

- A. General: Although product is a sealant, it is being specified as a filler to prevent debris accumulation and allow expansion and contraction under shrinkage and thermal loads. It does not need to meet proportional sealant geometry requirements.

- B. Filler for Potable or Non-Potable Water Containment Structures:
 - 1. Multicomponent sealant, self-leveling or nonsag as required for level, sloping, or vertical joints.
 - 2. Color: White.
 - 3. Manufacturer and Product: Sika Corp., Lyndhurst, NJ; Sikaflex-2c SL.
- C. Filler for Nonpotable Water Containment Structures Only:
 - 1. Pourable, two-component, cold-applied compound meeting ASTM C920, Type M, Grade P, Class 25, Use T.
 - 2. Color: Black.
 - 3. Manufacturer and Product: W.R. Meadows, Inc., Elgin, IL; Gardox.
- D. Urethane or Polyurethane Filler for Aeration or Oxygenation Basins:
Two-component, pourable, immersible, and compatible with Project-specific, high-purity oxygen environment, of self-leveling or nonsag consistency.
 - 1. Example Manufacturer and Product: Sika Corp., Lyndhurst, NJ; Sikaflex 2c SL.
 - 2. Primer: As recommended by manufacturer.

2.08 STEEL EXPANSION JOINT DOWELS

- A. Dowels: ASTM A36/A36M round smooth steel bars.
- B. Bar Coating: As specified in Section 09 90 00, Painting and Coating, with factory-applied epoxy coating and factory or field applied lubrication coating.

2.09 ACCESSORIES

- A. Joint Sealant: Polyurethane as specified in Section 07 92 00, Joint Sealants.
- B. 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.

- C. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.
- D. Steel Reinforcement: As specified in Section 03 21 00, Steel Reinforcement.
- E. Nails: Galvanized, as required for securing premolded joint filler.
- F. Galvanized Rebar at Control Joints: ASTM A767/A767M and ASTM A615/A615M Grade 60 prior to galvanizing.
- G. 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 steel reinforcement 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. Expansion Joint:
 - 1. Use wire brush or motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic waterstop to top of joint.
 - 2. Use dry, high-pressure air to remove dust and foreign material, and dry joint.
 - 3. Prime surfaces as required before placing joint filler.
 - 4. Avoid damage to waterstop.

C. Contraction Joint and Control Joint:

1. Coat concrete surfaces above and below plastic waterstop with bond breaker.
2. Do not damage or coat waterstop.

D. Construction Joint with Hydrophilic Waterstop:

1. Follow hydrophilic waterstop manufacturer's written instructions.
2. Clean debris, dirt, dust, and foreign material from concrete surface. Concrete surface must be smooth, clean, and dry. Grind concrete as required.

3.03 INSTALLATION OF WATERSTOPS

A. General:

1. Continuous waterstop 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 steel reinforcement 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 horizontal 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 ribbed waterstop to confirm full consolidation without voids, then place remaining concrete to full height of slab.

B. Plastic Waterstops:

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.

C. Hydrophilic Waterstop:

1. Install in accordance with manufacturer's written instructions.
2. Provide minimum of 2-1/2 inches of concrete cover over waterstop. When structure has two layers of steel reinforcement, locate centered between layers of steel or as shown.
3. Apply adhesive to concrete surface and allow to dry for specified time before applying waterstop strip.
4. Lap ends of waterstop strip together at splices and corners and join with sealant.
5. Verify that waterstop is anchored firmly in place before placing concrete. Do not allow vibrator to come into contact with waterstop.
6. Lap hydrophilic waterstop 2 feet minimum with intersecting plastic waterstops.

3.04 EXPANSION JOINT INSTALLATION

A. Premolded Joint Filler:

1. Sufficient in width to completely fill joint space where shown.
2. Install per manufacturer's written instructions.
3. If waterstop is in joint, cut premolded joint filler to butt tightly against waterstop and concrete face.
4. Precut premolded joint filler to required depth at locations where joint filler or sealant is to be applied.

5. Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above waterstop, in slabs, shall be formed and removed so that entire space down to waterstop can be filled with the pourable joint filler.
6. Vibrate concrete thoroughly along joint form to produce dense, smooth surface.

B. Bituminous Type Premolded Joint Filler:

1. Drive nails approximately 1 foot 6 inches on center through filler, prior to installing, to provide anchorage embedment into concrete during concrete placement.
2. Secure premolded joint filler in forms before concrete is placed.

C. Sponge Rubber Joint Filler: Install per manufacturer's written instructions.

D. Pourable Joint Filler:

1. General:
 - a. Install in accordance with the manufacturer's written instructions, except as specified below:
 - 1) Apply primer prior to pouring joint filler.
 - 2) Fill entire joint above the waterstop with joint filler as shown.
 - 3) Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.
 - 4) Sealant products used as fillers need not meet sealant geometry parameters. Do not use backing rods.

E. Steel Expansion Joint Dowels:

1. Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to joint in both plan and section view, so as to permit joint to expand or contract without bending dowels.
2. Secure dowels tightly in forms with rigid ties.
3. Install steel reinforcement in concrete as shown.

3.05 CONTRACTION JOINT INSTALLATION

- A. Place bond breaker above and below waterstop.
- B. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface. Do not roughen surface.

3.06 CONTROL JOINT INSTALLATION

- A. Locate galvanized steel reinforcement as shown.
- B. Install waterstop.
- C. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface. Do not roughen surface.
- D. Install bond breaker to concrete surfaces above and below waterstop.

3.07 PREFORMED CONTROL JOINTS

- A. Use only where specifically shown; do not use in water-holding basins.
- B. Locate slightly below top of slab.
- C. Install in accordance with manufacturer's written instructions in straight, full-length pieces.
- D. Steel Strip Type with Preformed Groove: Brace to withstand pressure of concrete during and after placement using only approved stakes and other secondary installation materials.

3.08 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.

3.09 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

**SECTION 03 21 00
STEEL REINFORCEMENT**

PART 1 GENERAL

1.01 GENERAL

- A. Steel reinforcement shall comply with ACI 301 and as modified in the following.

1.02 REFERENCES

- A. The following is a list of standards which 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. SP-66, Detailing Manual.
 2. American Welding Society (AWS): D1.4/D1.4M, Structural Welding Code - Reinforcing Steel.
 3. ASTM International (ASTM):
 - a. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - b. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - c. A767/767M, Standard Specification for Zinc-Coated (Galvanized) Steel bars for Concrete Reinforcement.
 - d. A775/A775M, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - e. A1064/A1064M, Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 4. Concrete Reinforcing Steel Institute (CRSI):
 - a. Placing Reinforcing Bars.
 - b. Manual of Standard Practice.
 5. International Code Council (ICC): Evaluation Services Report.

1.03 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings prepared in accordance with ACI 301 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 steel reinforcement 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.
3. Test results of field testing.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with ACI 301 and recommendations of CRSI Placing Reinforcing Bars.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars:

1. Includes stirrups, ties, and spirals.
2. ASTM A615/A615M, Grade 60, where welding is not required.
3. ASTM A767/767M, Grade 60, for galvanized bars.

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) Erico Products, Inc., Cleveland, OH; Lenton Lock Mechanical Rebar Splicing System.
 - 3) Richmond Screw Anchor Co., Inc., Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.

C. Welded Wire Fabric:

1. ASTM A1064, using wire of 75 ksi minimum tensile strength.
2. Furnish flat sheets only, rolled sheets not permitted.

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.

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.

3.02 INSTALLATION

- A. Unless otherwise specified, place reinforcing steel in accordance with CRSI Recommended Practice for Placing Reinforcing Bars.
- B. Splices and Laps:
 1. Lap splice reinforcing: Refer to Structural General Notes in Drawings for additional information.
 2. Tie splices with 18 gauge annealed wire as specified in CRSI Standard.

3.03 WELDED WIRE FABRIC INSTALLATION

- A. Use only where specifically shown.
- B. Extend fabric to within 2 inches of edges of slab and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.

- C. Tie laps and splices securely at ends and at least every 24 inches with tie wire.
- D. Place welded wire fabric on concrete blocks and rigidly support equal to that provided for reinforced bars. Do not use broken concrete, brick, or stone.
- E. Do not use fabric that has been rolled. Install flat sheets only.

3.04 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

**SECTION 03 24 00
FIBROUS REINFORCING**

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. C78, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - b. C1116, Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
 - c. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.

1.02 DEFINITIONS

- A. Aspect Ratio: The ratio of length to diameter of the fiber.
- B. Fibrillated Fibers: Fibers in bundles that, when added to concrete during mixing, separate into uniformly distributed angular fibrils (fiber strands) which act as secondary concrete reinforcement.
- C. Micro-Fibers: Shorter length, low dose, typically 0.1 percent by volume fibers designed to control plastic shrinkage cracking.
- D. Monofilament Fiber: Single filament fiber.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Minimum residual strength index of 50 psi.
 - 2. 2-hour fire resistance rating when tested under ASTM E119 on Series 700, Series 800, and Series 900 composite metal deck assemblies.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product data for fibrillated fibers.
 - 2. Fiber reinforced concrete mix design.

B. Informational Submittals:

1. Manufacturer's written instructions for mixing and batching of fibrillated fibers.
2. Fiber manufacturer's Certificate of Compliance.
3. Manufacturer's written instruction for mixing and batching of fibrillated fibers.
4. Manufacturer's written test procedure for the residual strength index of fiber reinforced concrete.
5. Certificate of Compliance from concrete supplier as to type, brand name, and amount of fibers added to mix.
6. Fiber manufacturer's certification of registration as proof of ISO 9002 Fiber Manufacturing Facility Certification.

PART 2 PRODUCTS

2.01 MATERIALS

A. Micro-Fibers:

1. 100 percent virgin polypropylene self-fibrillating fibers.
2. Multidesign gradation.
3. Fibrillated bundles to allow uniform distributed angular fibrils (fiber strands) when mixed into concrete.
4. Specific Gravity: 0.91 minimum.
5. Reprocessed olefin materials are not allowed.
6. Type III fibers conforming to ASTM C1116, Part 4.1.3.
7. Fiber Length: 0.50 inch to 1.0 inch.
8. Manufacturers and Products:
 - a. Euclid Chemical Company, Cleveland OH; Fiberstrand F.
 - b. Propex Concrete Systems Corporation, Chattanooga, TN; Fibermesh 300.

B. Concrete: Components shall conform to Section 03 30 00, Cast-in-Place Concrete.

2.02 CONCRETE MIX DESIGN AND CONCRETE MIXING

- A. In accordance with Section 03 30 00, Cast-in-Place Concrete.
- B. Add 1.5 pounds minimum per cubic yard at the time concrete is batched.
- C. Mix fibers into concrete in accordance with fiber manufacturer's instructions.

PART 3 EXECUTION

3.01 PLACING, PROTECTING, CURING, AND FINISHING

- A. In accordance with Section 03 30 00, Cast-in-Place Concrete.

3.02 FIELD QUALITY CONTROL

- A. Test as specified in Section 03 30 00, Cast-in-Place Concrete.
- B. Test fiber reinforced concrete with a modified version of ASTM C78 test using the printed test procedure provided by Fibermesh.
- C. Test minimum of two beam Samples prior to casting the concrete.
- D. Test minimum of two additional beam Samples for each 25 cubic yards or any portion thereof used on the Project.

3.03 MANUFACTURER'S SERVICE

- A. Provide the services of a technical representative to instruct the concrete supplier in proper batching and mixing of materials.

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. E329, Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
3. National Ready Mixed Concrete Association (NRMCA).

1.02 DEFINITIONS

- A. Basin Train: Series of interconnected basins that operate as a unit with same water level.
- B. Cold Weather: When ambient temperature is below 40 degrees F or is approaching 40 degrees F and falling.

- C. Contractor's Licensed Design Engineer: Individual representing Contractor who is licensed to practice engineering as defined by statutory requirements of professional licensing laws in state or jurisdiction in which Project is to be constructed.
- D. 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.
- E. 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.
- F. Hot Weather: As defined in ACI 305.1.
- G. Hydraulic Structure: Liquid containment structure.
- H. New Concrete: Less than 60 days old.
- I. 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 61 00, Common Product Requirements, for the following:
 - 1) Portland cement.
 - 2) Fly ash.
 - 3) Slag cement.
 - 4) Silica Fume.
 - 5) Aggregates, including specified class designation for coarse aggregate.

- 6) Admixtures.
- 7) 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) Percent of fine aggregate weight to total aggregate weight.
 - 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. Tightness test results.
7. 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. Flatwork Finisher: Unless otherwise permitted, at least one person on finishing crew shall be certified as an ACI Flatwork Finisher, or equivalent.
4. Testing Agency: Unless otherwise permitted, an independent agency, acceptable to authorities having jurisdiction, 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 who authored Statement of Special Inspection Plan or Engineer's designee.
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 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. Slag Cement: In accordance with ASTM C989, Grade 100 or Grade 120.
 - c. Silica Fume: ASTM C1240.

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, or manufactured sand from same source as coarse aggregate.
 - 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 5 percent mass of total sample.
 - 2) Limit coal and lignite to 1.0 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.
 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.
 7. Plasticizing Admixture: ASTM C1017/C1017M, Type I or Type II.
 8. Shrinkage Reducing Admixture:
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Tetraguard AS20.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon SRA Series.
 - 3) W. R. Grace & Co., Cambridge, MA; Eclipse Series.
- 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 SO₄: 3,000 ppm.
 - c. Alkalis as (Na₂O + 0.658 K₂O): 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. Fiber Reinforced Grout Topping: Provide creamy cement-water slurry mixture, thick enough to be broomed into place and sustain approximate 1/4-inch thickness until topping is cast.

- C. 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.

- D. 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.

- E. Crack Repair: In accordance with requirements of Section 03 64 23, Epoxy Resin 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. Unless otherwise permitted, use water-reducing admixture or water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture in pumped concrete, in concrete with a water-cementitious materials ratio below 0.50, and in concrete that is part of a liquid-containment structure.

5. Unless otherwise permitted, use water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture in columns, piers, pilasters, and walls.
6. Use water-reducing admixture or high-range, water-reducing admixture, or plasticizing 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. Resistance to alkali-silica reaction: Unless otherwise specified, or unless members are assigned to Exposure Class C0, use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction.
 - a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 shall not exceed 0.04 percent at 1 year.
 - b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 shall not exceed 0.10 percent at an age of 16 days. Supporting data must be supplied for each aggregate showing expansion in excess of 0.10 at 16 days when tested in accordance with ASTM C1260.
 - c. Alkali content in concrete (LBA) excluding that from supplementary cementitious materials shall not exceed 4 lb/yd³ for moderately reactive aggregate or 3 lb/yd³ for highly reactive aggregate. Reactivity shall be determined by testing in accordance with ASTM C1293 and categorized in accordance with ASTM C1778. Alkali content shall be calculated as follows:
 - 1) $LBA = (\text{cement content, lb/yd}^3) \times (\text{equivalent alkali content of portland cement in percent}/100 \text{ percent})$

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. Prior to submitting mix design, consult with concrete producer and select a target slump value at point of delivery, for each application of each design mix. Unless otherwise permitted, target slump value will then be enforced for duration of Project.
 2. Design mixes that include a high-range, water-reducing or a plasticizing admixture shall have a minimum slump of 2 inches prior to addition of admixture. Unless otherwise permitted, 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: Fine aggregate shall be in range of 36 percent to 40 percent of total aggregate weight.

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. Where vapor retarder or barrier is required, coordinate subgrade preparation with requirements in Division 07 of Specifications.
 - 2. Reinforcement: Secure in position before placing concrete.
 - 3. 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.
 - 4. Placement frequency shall be such that lift lines will not be visible in exposed concrete finishes.
 - 5. Use placement devices, for example chutes, pouring spouts, and pumps as required to prevent segregation.
 - 6. 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.
 - 7. 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.
 - 8. Do not use aluminum conveying devices.
 - 9. Provide sufficient illumination in the interior of forms so concrete deposition is visible, permitting confirmation of consolidation quality.
 - 10. 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.
 - 11. Trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.
 - 12. 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 expansion, 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. Provide vertical construction joints in walls and slabs at maximum spacing of 40 feet, unless shown or approved otherwise.
 - c. When vertical expansion, contraction, or control joint spacing does not exceed 60 feet, intermediate construction joints are not required.
 - d. 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. Expansion or 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 FIBER REINFORCED GROUT TOPPING

- A. Location: Clarifier.
- B. General: Provide bonded fiber reinforced grout topping overlay with surface compatible with regard to finish and location tolerance for clarifier mechanism to operate on.

- C. Do not place grout topping on floor of clarifier tanks until equipment for tanks have been completely installed and in working order.
- D. Surface Preparation:
 - 1. Provided rake finish on clarifier base slab.
 - 2. Prepare concrete slab by high-pressure water blasting machines capable of removing loose and deleterious material on raked concrete surface.
 - 3. Collect spent water and debris and dispose in location and manner acceptable to Owner.
 - 4. Square edges of removed concrete to avoid tapered shoulders.
 - 5. Do not use power-driven jackhammers, scabblers, or scarifiers.
 - 6. High-pressure, water-blast areas to receive grout topping no more than 24 hours before placement of bonding agent.
 - a. Remove laitance and contamination from existing concrete.
 - b. Saturate existing concrete slab for 24 hours prior to topping placement.
 - c. Surface shall be damp but free of standing water at time of application of grout topping.
- E. Fiber Reinforced Grout Topping Application:
 - 1. Attach leveling guide board to rake arm as recommended by mechanism manufacturer.
 - 2. Hand scrub thick creamy cement-water slurry coating into existing concrete surfaces, just ahead of placement of grout topping.
 - 3. Before slurry coating begins to dry, place fiber reinforced grout topping in front of the rake arm and leveling board.
 - 4. Work fiber reinforced grout topping into place using conventional placing tools. Do not use leveling guide on rake arm to move grout topping.
 - 5. Check grout elevation by measuring to top of grout from leveling guide board on rake arm. Place grout within specified tolerances.
 - 6. Cure concrete as specified in Section 03 39 00, Concrete Curing.
- F. Finish: Provide Type S-7 slab finish as described in Article Concrete Slab Finishes.

3.03 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.

3.04 REPAIRING CONCRETE

A. General:

1. Inject cracks that leak with crack repair epoxy as specified in Section 03 64 23, Epoxy Resin 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:

1. Unless otherwise specified, fill with specified repair material.
 - a. 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 install plug.
3. Dry pack entire hole from both sides of plug with nonshrink grout, as specified in Section 03 62 00, 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.

3.05 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, Epoxy Resin 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, Epoxy Resin Injection Grouting.

C. Type W-4 (Finish for Cementitious Coatings): Not Used.

D. Type W-5 (Finish for Painting):

1. In accordance with requirements for Type W-2 except as follows:
 - a. Leave surface ready for painting as specified in Section 09 90 00, Painting and Coating.

3.06 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: 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. Type S-7 (Clarifier Slab):

1. Provide rake finish of clarifier slab main surface as specified.
2. Prepare slab surface and moisture condition prior to grout placement as specified.
3. Disengage clarifier mechanism shall be from drive and install wood boards to clarifier mechanism to serve as a screed guide. Screeds shall establish final profile of placed grout.
4. Apply scrubbed slurry coat to surface as specified.
5. Install grout and provide float finish of final grout topping.

H. 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.

3.07 CONCRETE SLAB TOLERANCES

A. Slab Tolerances:

1. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified, or as required by equipment manufacturer's tolerance requirements for purchased equipment. The most stringent tolerance between manufacturer and specification shall govern.

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.

3.08 BEAM AND COLUMN FINISHES

- A. Type B-1: Match wall Type W-1.
- B. Type B-2: Match wall Type W-2.
- C. Type B-3:
 1. Repair rock pockets.
 2. Fill air voids.
 3. Match wall Type W-4.
- D. Type C-1: Match wall Type W-1.
- E. Type C-2: Match wall Type W-2.
- F. Type C-3:
 1. Fill air pockets.
 2. Match wall Type W-4.

3.09 BACKFILL AGAINST STRUCTURES

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.

- B. Refer to General Structural Notes on the Drawings for additional requirements, including elevated slab and diaphragm completion prior to backfill.
- C. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

3.10 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. If result of 7-day concrete strength test is less than 50 percent of specified 28-day strength, extend period of moist curing specified in Section 03 39 00, Concrete Curing, by 7 additional days.
 3. Provide a minimum of one spare test specimen per sample. Test spare cylinder as directed by Engineer.
- C. Evaluation and Acceptance of Fiber Reinforced Grout Topping in Clarifier:
1. Sound surface after termination of 28-day moist curing period by tapping with steel hammer, rod, or electro-mechanical sounding device in accordance with ASTM D4580.
 2. Core drill 2-inch to 4-inch diameter cores approximately 1/2 inch through topping of hollow sounding areas and into slab. Verify bond by pulling on topping and by striking with hammer and chisel. Repair core holes as specified for defective areas.
 3. Determine bond of topping.
 4. Disbonded, cracked, and broken fiber reinforced grout topping shall be cause for rejection.
 5. Evaluation and Acceptance of Fiber Reinforced Grout Topping: Owner will test and evaluate topping with Samples provided by Contractor.
 6. Reject fiber reinforced grout topping if topping is not tightly bonded to concrete slab below.
- 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.

G. Liquid Tightness Tests:

1. Purpose: To determine integrity and liquid-tightness of finished exterior and interior concrete surfaces of liquid containment structures.
2. Test the following structures for liquid-tightness:
 - a. 10 – Grit Removal Facility, test EL 835.0.
 - b. 15 – Bioreactor, test EL 831.0.
 - c. 25 – Clarifier, test EL 826.0.
 - d. 35 – Effluent Filters, test EL 825.0.
 - e. 40 – UV Facility, test EL 824.25.
3. Water for initial tightness test will be provided by Owner.
4. Water source will be potable.
 - a. Provide means to transport water to structure to be tested.
 - b. If additional tightness tests are required because of failure to meet criteria, provide water for subsequent tests.
5. After testing has been completed, dispose of test water in a manner approved by Owner.
6. Liquid-Tightness Test Requirement:
 - a. Perform tightness tests in accordance with ACI 350.1 and as specified herein.
 - b. Do not place backfill or install brick facing, grout topping slab, coatings, or other work that will cover concrete surfaces until tightness testing has been completed and approved.
 - c. Measure evaporation, precipitation, and temperature as specified.
7. Measure water surface at two points 180 degrees apart when possible where attachments, such as ladders exist, at 24-hour intervals.

8. Acceptance Criteria:
 - a. Volume loss shall not exceed 0.050 percent of contained liquid volume per 24-hour period, adjusted for evaporation, precipitation, and temperature.
 - b. Acceptance that structure has passed tightness test shall be based on total volume loss at end of specified test period.
9. Repairs When Test Fails:
 - a. Dewater structure; fill leaking cracks with crack repair epoxy as specified in Section 03 64 23, Epoxy Resin Injection Grouting.
 - b. Patch areas of damp spots previously recorded, and repeat water leakage test in its entirety until structure successfully passes test.

3.11 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.

3.12 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.

3.13 SCHEDULE OF CONCRETE FINISHES

- A. Form Tolerances: As specified in Section 03 10 00, Concrete Forming and Accessories.
- B. Provide concrete finishes as scheduled:

Area	Type of Finish	Required Form Tolerances
Exterior Wall Surfaces		
Above grade/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
Walls to receive cementitious coatings	W-4	W-B
Interior Wall Surfaces		
Open top hydraulic structures and basins/not painted or coated	W-2	W-A
Covered hydraulic structures and basins/not painted or coated	W-1	W-A
Hydraulic structures, channels, and basins/painted or coated	W-5	W-A
Buildings, pipe galleries, and other dry areas/not painted or coated	W-2	W-A
Buildings, pipe galleries, and other dry areas/painted or coated	W-5	W-A
Exterior Slabs		
Roof slab/exposed	S-5	S-B
Hydraulic structures and basins/top of wall	S-5	S-B
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

Area	Type of Finish	Required Form Tolerances
Interior Slabs		
Buildings, pipe galleries, and other dry areas	S-1	S-B
Slabs to receive mortar setting bed for tile	S-2	S-A
Slabs to receive resilient flooring or carpet	S-1	S-A
Hydraulic channels	S-1	S-A
Clarifier main slab (to receive grout topping)	S-7	S-A
Clarifier grout topping	S-2	S-A
Other hydraulic structures and basins	S-5	S-A
Underside of elevated slabs	S-3	S-A
Beams and Columns		
Beams/coated	B-3	B-A
Beams/not coated	B-2	B-A
Columns/coated	C-3	C-A
Columns/not coated	C-2	C-A

3.14 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, CMD1 - Class 4500F3S1P2C2.
2. Concrete Mix Design, CMD2 - Class 4500F2S1P1C1.
3. Concrete Mix Design, CMD3 - Class 4500F1S1P0C1.
4. Concrete Mix Design, CMD4 - Class CF00F1S1P0C1.
5. Concrete Mix Design, CMD5 - Class 4500F3S1P1C2.
6. Concrete Mix Design, CMD6 - Class GT00F0S1P1C1.

END OF SECTION

(CMD1), CLASS 4500F3S1P2C2

- A. Mix Locations: Hydraulic Structures.
- 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.
 - 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.
 - 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
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. Slag Cement: 50 percent.

- c. Silica Fume: 10 percent.
 - d. Combined Fly Ash and other Pozzolans and Slag Cement, Slag Cement, and Silica Fume: 50 percent, with fly ash and other pozzolans not exceeding 25 percent, and silica fume not exceeding 10 percent.
 - e. Combined Fly Ash and other Pozzolans and Silica Fume: 35 percent, with fly ash and other pozzolans not exceeding 25 percent, and silica fume not exceeding 10 percent.
 - f. 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.
 - 2) Slag used in the manufacture of an IS blended cement, ASTM C595/C595M.
 - 3) Silica fume, ASTM C1240, present in blended cement.
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 (MS), for blended hydraulic cements.
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. 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.

(CMD2), CLASS 4500F2S1P1C1

- A. Mix Locations: Typical, unless otherwise specified.
- B. Exposure Categories and Classifications: F2S1P1C1.
- 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 4,500 psi at 28 days.
 - a. Designed to conform to shrinkage limits.
 - b. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - 1) Slabs to receive a hard-troweled finish.
 - c. 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 sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on sieved fraction passing 1-1/2-inch sieve in accordance with ASTM C231/C231M.

3. 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).
 4. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent, unless otherwise specified.
 - a. 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.

(CMD3), CLASS 4500F1S1P0C1

A. Mix Locations:

1. Electrical 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 4,500 psi at 28 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.
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	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.

5. 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.
 6. 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.

(CMD 4), CLASS CF00F1S1P0C1

- A. Mix Locations: Provide for Concrete Fill 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. Concrete mix shall be 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	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.

6. 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 Types IP or 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 0.10 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.
 8. Fiber Reinforcement:
 - a. Where required, provide polypropylene micro-fibers in design mix in accordance with Section 03 24 00, Fibrous Reinforcing.
 - b. Add fiber-reinforcement to mix in concrete plant.
- D. Refer to PART 1 through PART 3 of this Section for additional requirements.

(CMD5), 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 4,500 psi at 28 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.
 - 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. Slag Cement: 50 percent.
 - c. Silica Fume: 10 percent.
 - d. Combined Fly Ash and other Pozzolans and Slag Cement, Slag Cement, and Silica Fume: 50 percent, with fly ash and other pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - e. Combined Fly Ash and other Pozzolans and Silica Fume: 35 percent, with fly ash and other pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - f. 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.
 - 2) Slag used in the manufacture of an IS blended cement, ASTM C595/C595M.
 - 3) Silica fume, ASTM C1240, present in blended cement.
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.

8. Fiber Reinforcement:
 - a. Where required, provide polypropylene micro-fibers in design mix in accordance with Section 03 24 00, Fibrous Reinforcing.
 - b. Add fiber-reinforcement to mix in concrete plant.
- D. Refer to PART 1 through PART 3 of this section for additional requirements.

(CMD6), CLASS GT00F1S1P0C1

- A. Mix Locations: Grout topping slab in Clarifiers.
- 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 0.40.
 - 2. Minimum compressive strength (f'_c) shall be 4,500 psi at 28 days.
 - 3. Design mix shall be designed to conform to shrinkage limits.
 - 4. Aggregate Grading: Aggregate shall conform to requirements for fine aggregate in accordance with ASTM C33/C33M.
 - 5. 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.
 - 6. Unless otherwise specified, provide 6 percent air content.
 - a. See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.
 - b. Tolerance of air content is plus or minus 1.5 percent.
 - 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 Types IP or 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.
 - 8. Unless otherwise permitted, minimum cementitious materials content in mix design shall be 600 pounds per cubic yard.
 - 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.

10. Fiber Reinforcement:
 - a. Provide polypropylene micro-fibers in design mix in accordance with Section 03 24 00, Fibrous Reinforcing.
 - b. Add fiber-reinforcement to grout topping in concrete plant.
 - c. Slump as required to maintain homogeneous mix and to allow placement to meet equipment manufacturer's placing tolerance.
 - d. Mix fiber reinforced grout topping to consistency, easily screeded with clarifier mechanism, but not too thin that topping will not maintain to required thickness.

D. Grout Strength Tests:

1. Make three 2-inch by 2-inch cubes for each 150 cubic feet of grout. Use restraining caps for cube molds in accordance with ASTM C109/C109M.
2. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C109/C109M, except that the proposed grout topping mix design shall be tested in lieu of the mix specified in ASTM C109/C109M.
3. Store cubes at 70 degrees F.
4. Nonsrink grout cubes shall test equal to or greater than minimum strength specified.
5. Strength Test Failures: Unless otherwise permitted, grout work failing strength tests shall be removed and replaced.

E. Refer to PART 1 through PART 3 of this section for additional requirements.

**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. American Concrete Institute (ACI): 308.1, Specification for Curing Concrete.
 2. 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.
 - c. Penetrating water repellent sealer.
 - d. Clear liquid densifier.
 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 61 00, Common Product Requirements, for the following:
 - a. Curing compound showing moisture retention requirements.
 - b. Retardants for exposed aggregate finish.

PART 2 PRODUCTS

2.01 MATERIALS

A. Curing Compound:

1. Water-based, high-solids content, nonyellowing, curing compound meeting requirements of ASTM C1315 Type I, Class A.
2. Manufacturers and Products:
 - a. Euclid Chemical Co., Cleveland, OH; Super Diamond Clear VOX.
 - b. WR Meadows, Inc., Hampshire, IL; VOCOMP-30.
 - c. Vexcon Chemical, Inc.; Philadelphia, PA; Starseal 1315.
 - d. Dayton Superior; Safe Cure and Seal 1315 EF.

B. Evaporation Retardant:

1. Optional: Fluorescent fugitive dye color tint that disappears completely upon drying.
2. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee, MN; MasterKure ER 50.
 - b. Euclid Chemical Co., Cleveland, OH; Eucobar.

C. Penetrating Water Repellent Sealer: Water based, ready to use, single component, silane/siloxane, penetrating, clear water repellent sealer.

1. Viscosity: 50 cps.
2. Flash Point: 200 degrees F.
3. NCHRP No. 244 Reduction in Chloride Content:
 - a. Average: 82 percent.
 - b. Minimum Required: 75 percent.
4. NCHRP No. 244 Reduction in Weight Gain:
 - a. 21 Days: 85 percent.
 - b. VOCs: 50 g/l.
 - c. Depth of Penetration: 1/4 inch.
5. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee MN; MasterProtect H 400.
 - b. Euclid Chemical Co.; Baracade WB 244.

D. Water: Clean and potable, containing less than 500 ppm of chlorides.

PART 3 EXECUTION**3.01 CONCRETE CURING****A. General:**

1. Cure all concrete in accordance with project specifications and ACI308.1.
2. Where surfaces are part of an environmental structure, are to receive coatings, painting, cementitious material, or other similar finishes, use only water curing procedures. Refer to Interior Finish Schedule for surfaces to receive coatings.
3. Where curing compound cannot be used, water curing as described below or special methods using moisture shall be agreed upon by Engineer prior to placing concrete.
4. As required in Section 03 30 00, Cast-in-Place Concrete, if result of 7-day concrete strength test is less than 50 percent of specified 28-day strength, extend period of moist curing specified below, by 7 additional days.

B. Use one of the following methods as approved by Engineer:

1. Vertical Surfaces
 - 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, where allowed, immediately after removal of forms.
2. Horizontal Surfaces:
 - 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: Continuously sprinkle exposed surface for 7 days.
 - d. Method 4: Apply curing compound, where allowed, immediately after final finishing when surface will no longer be damaged by traffic.

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 PENETRATING WATER REPELLENT SEALER APPLICATION

- A. Apply where indicated on Interior Finish Schedule.
- B. Before application and with Work above completed, water cure concrete walls and floors for a minimum of 28 days to receive sealer, keep clean, unpainted, and free from membrane curing compounds.
- C. Concrete to receive penetrating sealer shall be dry for a minimum 24 hours immediately prior to application.
- D. Apply per manufacturer's recommendations utilizing low pressure airless spray equipment.
 - 1. Actual coverage and number of coats to be determined by field test sample application and water absorption testing. Final approval by Owner is required.
- E. Apply at a coverage rate of 125 square feet per gallon to 200 square feet per gallon. Cure penetrating sealer on slabs for the minimum time recommended by manufacturer prior to allowing foot or vehicular traffic.

3.04 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.
- B. Provide penetrating water repellent sealer manufacturer's representative to demonstrate proper application of product.
- C. 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
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. C307, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
 - c. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - d. C579, Standard Test Methods for Compressive Grout Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - e. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
 - f. C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - g. C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - h. C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - i. C1181, Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.
 - j. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

1.02 SUBMITTALS

- A. Action Submittals:
1. Product data of grouts.
 2. Proposed method for keeping existing concrete surfaces wet prior to placing nonshrink 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. Mixing of grout.
2. Manufacturer's proposed training schedule for grout work.
3. Manufacturer's Certificate of Compliance in accordance with **Section 01 61 00, Common Product Requirements**.
 - 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: 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.
7. List of Contractor's equipment installation staff trained by grout manufacturer's representative in:
 - a. Nonshrink grout installation and curing.
 - b. Epoxy grout installation and curing.

1.03 QUALIFICATIONS

- A. 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. Provide independent testing laboratory test results for testing conducted within last 18 months.

PART 2 PRODUCTS

2.01 NONSHRINK GROUT AND EPOXY GROUT SCHEDULE

A. Furnish nonshrink grout (Category I, II, and III) and epoxy grout for applications as indicated in the following schedule:

Application	Temperature Range	Max. Placing Time	
	40 deg F to 100 deg F	20 Min.	Greater Than 20 Min.
Blockouts for gate guides	I or II		II
Column baseplates single-story	I or II		II
Machine bases 25 hp or less	II	II	II
Baseplates for columns over one story	II	II	II
Form Tie-Through bolt openings	II	II	II
Machine bases 26 hp and up	III or Epoxy Grout	III or Epoxy Grout	III or Epoxy Grout
Baseplates and/or soleplates with vibration, thermal movement, etc.	III or Epoxy Grout	III or Epoxy Grout	III or Epoxy Grout

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 System, Inc., Shakopee, MN; MasterFlow 100.
 - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
 - c. Dayton Superior Corp., Miamisburg, OH; 1107 Advantage Grout.
 - d. US MIX Co., Denver, CO; US SPEC GP Grout.
 - e. Five Star Products Inc., Fairfield, CT; Five Star Grout.

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 90 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-yard to 9-yard loads in ready-mix truck.
8. Manufacturers and Products:
 - a. BASF Building Systems, Inc., Shakopee, MN; MasterFlow 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., Miamisburg, OH; Sure Grip High Performance Grout.
 - e. US MIX Co., Denver, CO; US SPEC MP Grout.

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; MasterFlow 885.
 - b. Euclid Chemical Co, Cleveland, OH; Hi-Flow Metallic Grout.

2.03 EPOXY GROUT

- A. High-strength, nonshrink, high-temperature epoxy grouting material developed for the support of heavy equipment with vibratory loads.
- B. Three-component mixture of a two-component epoxy resin system (100 percent solids) with a graded, precision aggregate blend.
- C. Premeasured, prepackaged system.
- D. Flowable.
- E. Minimum compressive strength in accordance with ASTM C579 Method B, 9,500 psi at 75 degrees F at 7 days, 11,000 psi at post cure.
- F. Maximum creep resistance in accordance with ASTM C1181 at 600 psi, 140 degrees F; $6.0 \text{ by } 10^{-3} \text{ in/in}$.
- G. Minimum bond strength in accordance with ASTM C882, 2,000 psi.
- H. Minimum tensile strength in accordance with ASTM C307, 2,000 psi.
- I. Maximum coefficient of thermal expansion in accordance with ASTM C531 at 73 degrees F to 210 degrees F, $23.0 \text{ by } 10^{-6} \text{ in/in/degrees F}$.
- J. Working Time: Minimum 2 hours at 50 degrees F; 1.5 hours at 70 degrees F; 50 minutes at 90 degrees F.
- K. Good chemical resistance.
- L. Good effective bearing area.
- M. Noncorrosive.
- N. Moisture insensitive.

- O. Modify resin and aggregate content where recommended by epoxy grout manufacturer to provide desired epoxy grout flow properties.
- P. Manufacturer and Product:
 - 1. BASF Building System, Inc., Shakopee MN; MasterFlow 648.
 - 2. Euclid Chemical Co., Cleveland, OH; E³-G.
 - 3. Dayton Superior Corp., Miamisburg, OH; Pro-Poxy 2000 Normal Set.
 - 4. Five Star Products Inc., Fairfield, CT; DP Epoxy Grout.

PART 3 EXECUTION

3.01 GROUT

- A. General: Mix, place, and cure grout in accordance with grout manufacturer's representative's training instructions.
- B. Epoxy Grout: Concrete slab shall be fully cured for 28 days to ensure excess water has evaporated. Test concrete surface for moisture in accordance with ASTM D4263 before epoxy grout is placed.
- C. Form Tie-Through Bolt Holes: Provide nonshrink grout, 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.
- D. Form Snap-Tie Hole: Fill tie hole in accordance with requirements of Section 03 30 00, Cast-in-Place Concrete.

3.02 GROUTING MACHINERY FOUNDATIONS

- A. 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. Surface roughness in accordance with manufacturer's written instructions.
- B. Clean metal surfaces of all paint, oil, grease, loose rust, and other foreign material that will be in contact with grout.
- C. Sandblast to bright metal all metal surfaces in contact with epoxy grout in accordance with manufacturer's written instructions.
- D. Set machinery in position and wedge to elevation with steel wedges, or use cast-in leveling bolts. Remove wedges after grout is set and pack void with grout.

- E. Form with watertight forms at least 2 inches higher than bottom of plate.
- F. Fill space between bottom of machinery base and original concrete in accordance with manufacturer's representative's training instructions.
- G. If grout cannot be placed from one edge and flowed to the opposite edge, air vents shall be provided through the plate to prevent air entrapment.
- H. Radius all corners of grout pad.
- I. Install expansion joints for epoxy grout placement in accordance with manufacturer's written instructions.

3.03 TANK FOUNDATIONS

- A. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material. Surface roughness in accordance with manufacturer's written instructions.
- B. Clean metal surfaces of all paint, oil, grease, loose rust and other foreign material that will be in contact with grout.
- C. Set tank in position and wedge to elevation with steel wedges, or use cast-in leveling bolts. Remove wedges after grout is set and pack void with grout.
- D. Form with watertight forms at least 2 inches higher than bottom of plate.
- E. Fill space between bottom of tank base and original concrete in accordance with manufacturer's representative's training instructions.

3.04 FIELD QUALITY CONTROL

- A. General:
 - 1. Performed by Project representative's inspection staff.
 - 2. Perform the following quality control inspections. The grout manufacturer's representative shall accompany the Project representative's inspection staff on the first installation of each size and type of equipment.
- B. Evaluation and Acceptance of Nonshrink Grout:
 - 1. Inspect the surface preparation of concrete substrates onto which nonshrink grout materials are to be applied, for conformance to the specified application criteria including, but not limited to, substrate profile, degree of cleanliness, and moisture.

2. Inspect preparation and application of nonshrink grout form work for conformance to the manufacturer's recommendations.
3. Conduct a final review of completed nonshrink grout installation for conformance to these Specifications.
4. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
5. 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.
6. 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.
7. Consistency: As specified in Article Nonshrink Grout. Flow cone test in accordance with ASTM C939. Grout with consistencies outside range requirements shall be rejected.
8. Segregation: As specified in Article Nonshrink Grout. Grout when aggregate separates shall be rejected.
9. Nonshrink grout cubes shall test equal to or greater than minimum strength specified.
10. Strength Test Failures: Nonshrink grout work failing strength tests shall be removed and replaced.
11. Perform bleeding test in accordance with ASTM C940 to demonstrate grout will not bleed.
12. Store cubes at 70 degrees F.
13. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C1107/C1107M.
14. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

C. Evaluation and Acceptance of Epoxy Grout:

1. Inspect ambient conditions during various phases of epoxy grouting installation for conformance with the epoxy grout manufacturer's requirements.
2. Inspect the surface preparation of concrete substrates onto which epoxy grout materials are to be applied, for conformance to the specified application criteria including, but not limited to, substrate profile, degree of cleanliness, and moisture.
3. Inspect the surface preparation of the metallic substrates onto which the epoxy primer is to be applied.
4. Inspect the epoxy-primed metallic substrate for coverage and adhesion.

5. Inspect preparation and application of epoxy grout form work for conformance to the manufacturer's recommendation.
6. Verify consistency obtained is sufficient for the proper field placement at the installed temperatures.
7. Inspect and record that the "pot life" of epoxy grout materials is not exceeded during the installation.
8. Inspect epoxy grout for cure.
9. Inspect and record that localized repairs made to grout voids are in conformance with the specification requirements.
10. Conduct a final review of completed epoxy grout installation for conformance to these Specifications.
11. Compression tests and fabrication of specimens for epoxy grout shall be made in accordance to ASTM C579, Method B, at intervals during construction as selected by the Project representative. A set of three specimens shall be made for testing at 7 days, and each earlier time period as appropriate.
12. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C579.
13. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

3.05 MANUFACTURER'S SERVICES

A. General:

1. Coordinate demonstrations, training sessions, and applicable Site visits with grout manufacturer's representative. Allow 2-week notice to grout manufacturer's representative for scheduling purposes.
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 grout.
3. Necessary equipment and materials shall be available for demonstration.
4. Conduct training prior to equipment mount installation work on equipment pads.
5. Training for each type of grout shall be not less than 4 hours' duration.

B. Nonshrink Grout Training:

1. Training is required for all Type II and Type III grout installations.
2. Provide nonshrink grout installation training by the qualified grout manufacturer's representative for Contractor's workers that will be installing nonshrink grout for baseplates and equipment mounts. Schedule training to allow Engineer's attendance.

3. Mix nonshrink grouts to required consistency, test, place, and cure on actual Project, such as, baseplates and form tie-through bolt holes to provide actual on-the-job training.
4. Use minimum of two 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. Include recommended grout curing methods in the training.
6. Mix and demonstrate patching through-bolt holes and blockouts for gate guides, and similar items.
7. Transport test cubes to independent test laboratory and obtain test reports.
8. Training by manufacturer's representative does not relieve Contractor of overall responsibility for this portion of the work.
9. Submit a list of attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

C. Epoxy Grout Training:

1. Provide epoxy grout installation training by the qualified epoxy grout manufacturer's representative for Contractor's workers that will be installing epoxy grout for equipment mounts. Schedule training to allow Engineer's attendance.
2. Include training in:
 - a. Performance testing such as compressive strength testing of the epoxy grout.
 - b. All aspects of using the products, from mixing to application.
3. Transport test cubes to independent test laboratory and obtain test reports.
4. Training by manufacturer's representative does not relieve Contractor of overall responsibility for this portion of the work.
5. Submit a list of attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

3.06 SUPPLEMENTS

- 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 three 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 90-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 90 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. @ 90 degrees F.
 - e. 40 min _____, sec. @ 90 degrees F.
 - f. 60 min _____, sec. @ 90 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. 2012 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 and indicated on the Statement of Special Inspection (Plan) in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Manufacturer's catalog information.
- B. Informational Submittals:
 - 1. Manufacturer's instructions for preparation, placement, drilling of holes, installation of anchors and adhesive, and handling of cartridges, nozzles, and equipment.
 - 2. Manufacturer's written letter of certification identifying installer's qualifications to install products.
 - 3. 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, mix ratio by volume, 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 2012 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 runoff.
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-V3 (ESR-3814) Adhesive Anchors.
 - b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-3G Epoxy Adhesive Anchors (ESR-4057).

- B. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.
- C. Reinforcing Dowels:
 - 1. As specified in Section 03 21 00, Steel Reinforcement.
 - 2. Smooth Epoxy-Coated Expansion Joint Dowels: As specified in Section 03 15 00, Concrete Accessories.

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 steel reinforcement 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 steel reinforcement is likely, drill hole at 10-degree angle or less and use prebent reinforcing bars.
- E. Adhesive:
 - 1. Install in accordance with written 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 ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspection (Plan) in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information on special inspection and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.
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 in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing and where concrete dowels are installed in overhead applications.
 3. Periodic inspection required where continuous inspection is not specified.
 4. Special Inspector will observe installation in accordance with requirements of the ICC Evaluation Services Report and will submit report including the following:
 - a. Product Description: Product name, rod diameter, and length.
 - b. Drill bit compliance.
 - c. Hole diameter, diameter, and depth and cleanliness.
 - d. Adhesive expiration date.
 5. Verification of dowel installation in accordance with manufacturer's published instructions
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

**SECTION 03 64 23
EPOXY RESIN INJECTION 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. 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. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. Hydraulic Structure: Liquid containment structure and/or structure designed to mitigate liquid infiltration.
- D. Injection: Method of bonding together, addressing or eliminating leakage through cracks or joints by installing resin under pressure to fill the void in crack or joint.
- E. Joint: A planned and formed discontinuity in concrete structure at junction of adjacent and sequential concrete placements and may contain embedded waterstops.
- F. Leak or Leakage: Crack or joint exhibiting presence of moisture, sign of efflorescence, intermittently wet to touch, or continuous flow of liquid.
- G. Narrow Cracks: Width equal to or less than 0.015 inch.
- H. Wide Cracks: Wider than 0.015 inch.

1.03 SUBMITTALS

A. Action Submittals:

1. Physical and chemical properties for epoxy resin.
2. Technical data for metering, mixing, and injection equipment.
3. Depth of penetration, length, material used, and procedures where epoxy is approved for use.
4. Marked up drawings of proposed epoxy injection repair crack locations, widths, and lengths and direction on structure.
5. Sample bottle.
6. Pot Life Test.
7. Slant Shear Test (Bond Strength).
8. Core Test Results.

B. Informational Submittals:

1. Manufacturer's recommended surface preparation procedures and application instructions for epoxy resins.
2. Manufacturer's Certificate of Compliance in accordance with **Section 01 61 00, Common Product Requirements**. Certified test results for each batch of epoxy resin.
3. Statements of Qualification for Epoxy Resin:
 - a. Manufacturer's Site representative.
 - b. Injection applicator.
 - c. Injection pump operating technician.
4. Sample of epoxy resin two component ratio and injection pressure test records for concrete crack repair work.
5. Installation instructions for repairing core holes with repair mortar.
6. Health and Safety Plans for confined space entry, and acid flushing work. Test results of epoxy resin bond tests.
7. Epoxy resin two component ratio and injection pressure test records for concrete crack repair work.

1.04 QUALITY ASSURANCE

A. Qualifications for Injection Staffs:

1. Manufacturer's Site Representative:
 - a. Capable of instructing successful methods of epoxy injection process for concrete structure.
 - b. Understands and is capable of explaining technical aspects of correct material selection and use.
 - c. Experienced in operation, maintenance, and troubleshooting of application equipment.

2. Injection Crew and Job Foreman:
 - a. Provide written and verifiable evidence showing compliance with the following requirements:
 - 1) Licensed or certified by epoxy resin material manufacturer.
 - 2) 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.
- B. Injected Epoxy Resin: Fill cracks and joints with minimum resin depth penetration no less than 90 percent of:
 1. Full thickness of concrete section for cracks or joints.
 2. Depth between waterstop and inside face of structure for joints with an embedded waterstop.
- C. Injected cracks and joints which leak shall be considered deficient work irrespective of depth of penetration. Reinjection of deficient work or, with approval of Engineer, provide other repairs to eliminate leakage.
- D. Bond Strength Test for Epoxy Resin:
 1. Concrete failure before resin failure.
 2. 1,500 psi minimum bond strength per ASTM C882 test requirements with no failure of either concrete or epoxy resin.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping:
 1. Package resin material in new sealed containers and label with following information:
 - a. Manufacturer's name.
 - b. Product name and lot number.
 - c. ANSI Hazard Classification.
 - d. ANSI recommended precautions for handling.
 - e. Mix ratio by volume for components.
- B. Storage and Protection: Store epoxy resin material containers in accordance with manufacturer's printed instructions and at ambient temperatures below 110 degrees F and above 45 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials and accessories specified in this section shall be products of:
1. BASF Construction Chemicals, LLC-Building Systems, Shakopee, MN; SCB Concsive Series products that meet properties indicated in sub-section 2.2.B.
 2. Sika Corp., Lyndhurst, NJ; Sikadur Series products that meet properties below.
 3. Euclid Chemical Co., Cleveland, OH; Euco Series (#452) products that meet properties below.

2.02 EPOXY INJECTION RESIN

- A. Two-component A and B structural epoxy resin for injection into cracks or joints in concrete structures for bonding or grouting.
- B. Uncured Resin Properties:

1. When mixed in ratio specified on resin container label:

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Pot Life (60-gram mass) @ 77, plus or minus 4 deg F	As specified in Article Source Quality Control	13 to 25 minutes	15 to 30 minutes
Pot Life (60-gram mass) @ 100, plus or minus 4 deg F	As specified in Article Source Quality Control	3 to 10 minutes	10 to 20 minutes
Viscosity @ 40, plus or minus 3 deg F	Brookfield RVT Spindle No. 4 @ 20 rpm	4,400 cps	600 cps
Viscosity @ 75 to 77 deg F	Brookfield RVT Spindle No. 2 @ 20 rpm	375 to 350 cps	175 to 140 cps

- C. Epoxy Resin Properties: When cured for 7 days at 77 degree F, plus or minus 3 degrees F and conditioned at test temperature 12 hours prior to test, unless otherwise specified.

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Ultimate Tensile Strength, psi	ASTM D368	8,000 min.	5,000 min.
Tensile Elongation @ Break, percent	ASTM D638	4.2 max.	3.0 max.
Flexural Strength, psi	ASTM D790	10,000 min.	10,000 min.
Flexural Modulus, psi	ASTM D790	5.5 x 10 ⁵ min.	4.5x10 ⁵ min.
Compressive Yield Strength, psi	ASTM D695*	15,000 min.	12,000 min.
Compressive Modulus, psi	ASTM D695*	4.0x10 ⁵ min.	4.0x10 ⁵ min.
Heat Deflection Temperature	ASTM D648*	130 deg F min.	140 deg F min.
Cured 3 days @ 40 deg F – Wet Concrete		3,500 psi min.	3,500 psi min.
Cured 1 day @ 77 deg F – Dry Concrete		5,000 psi min.	5,000 psi min.
Cured 3 days @ 77 deg plus or minus 3 deg F		5,000 psi min.	5,000 psi min.
*Cure test specimens so that peak exothermic temperature of resin does not exceed 100 degrees F.			
Note: 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 resin has cured.

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2.04 ACID FLUSHING SOLUTION

- A. Pre-mixed solution of food grade phosphoric acid diluted to a 5 percent plus or minus 0.5 percent of the volume of the bottle.

2.05 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.06 SAMPLE BOTTLE

- A. Five-inch natural wide mouth HDPE bottle or 4-ounce clear PVC cylinder bottle; supplied with caps.

2.07 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of epoxy resin.
- B. Pot Life Test:
 - 1. Condition Component A and Component 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. Mix components for 60 seconds using non-metallic stirring instrument. Scrape sides and bottom of cup periodically.
 - 4. Probe mixture once with non-metallic stirring instrument 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. Slant Shear Test: Prepare specimens and perform tests in accordance with ASTM C882.

PART 3 EXECUTION

3.01 GENERAL

- A. Unless permitted otherwise, structurally repair cracks or joints listed below:
 - 1. Cracks considered to be defective as defined in Section 03 30 00, Cast-in-Place Concrete.
 - 2. All vertical cracks or joints near corners or intersections.
 - 3. All horizontal cracks or joints at wall bases.
 - 4. All cracks or joints in walls of circular tanks.

5. All cracks or joints caused by voids or honeycombs.
 6. All horizontal joints with leaks and dampness.
 7. All cracks or joints caused by construction overloading.
 8. All vertical or diagonal cracks or joints caused by drying shrinkage within a distance equal to the height of wall from the face of corners or intersecting walls. Inject 90 days after placement, unless approved otherwise by the project Structural Engineer.
 9. All horizontal cracks or joints caused by drying shrinkage within a distance equal to one-quarter on the wall height above or below elevated slabs. Inject 90 days after placement, unless approved otherwise by the project Structural Engineer.
 10. All cracks or joints as a result of thermal shrinkage where the concrete member being injected has been allowed to dry after placement for a minimum of 90 days.
 11. All other cracks or joints as a result of drying shrinkage to be repaired 90 days or more after placement.
- B. Do not proceed with injection work until submittals have been reviewed and approved by Engineer.
- C. Perform cracks or joints injection work after removing defective surface materials and after performing surface preparation, but prior to applying surface repair material unless otherwise noted. See Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces, and Section 03 01 33, Repair of Horizontal Concrete Surfaces, for concrete surface repair system.
- D. Width of cracks may vary along length and through thickness of concrete section.
- E. Remove all excess, unused epoxy resin materials on concrete surfaces exposed to view prior to end of Work.

3.02 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter and mix two epoxy resin components and inject mixture into cracks or joints.
- 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 epoxy resin at pressures in accordance with epoxy resin manufacturer's printed instruction and able to maintain pressure.
- D. Automatic Shutoff Control: Provide sensors on both Component A and Component B reservoirs for stopping machine automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance: Maintain epoxy resin 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 valve 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.

3.03 PREPARATION

- A. Free cracks or joints from loose matter, dirt, laitance, oil, grease, efflorescence, salt, and other contaminants.
- B. Clean cracks or joints in accordance with epoxy resin manufacturer's instructions.
- C. Clean surfaces adjacent to cracks or joints from dirt, dust, grease, oil, efflorescence, and other foreign matter detrimental to bond of surface seal system and to expose the full extent of cracks and joints in accordance with manufacturer's printed instruction by low pressure water cleaning using a pressure of 1,000 psi to 3,000 psi.
- D. Do not use acids and corrosives for cleaning, other than those specified herein unless neutralized prior to injecting epoxy resin.
- E. During installation and curing of materials, if ambient temperature is expected to drop below manufacturer's recommended minimum temperature, provide enclosures and heat as required.
- F. Provide work platforms as required.
- G. Dry out cracks or joints if required by manufacturer's instructions.

3.04 APPLICATION

- A. All liquid is to be removed from hydraulic structure prior to commencing with epoxy injection, unless approved otherwise.
- B. Entry Ports:
 - 1. Establish openings for epoxy resin entry in surface seal along crack.
 - 2. Determine space between entry ports equal to thickness of concrete member to allow epoxy resin to penetrate to the full thickness of the member.
 - 3. Drill injection holes at an angle between 45 degrees and 60 degrees from surface of concrete and perpendicular to alignment of cracks or joints as indicated on Drawings, to intersect crack or joint at midpoint of concrete section, and intersect joints at midpoint between waterstop and interior concrete surface, except as noted otherwise.
 - 4. Locate drill holes on alternate sides of crack or joint where possible, unless orientation of crack or joint is known or has been verified by non-destructive testing techniques or core drilling.
 - 5. Drill Hole Spacing: Do not to exceed concrete thicknesses or 12 inches maximum, except as noted otherwise.
 - 6. Adjust location and angle of drill holes to suit orientation of crack or joint and at commencement of drilling holes for injection and at beginning of each subsequent shift.
 - 7. Take measures to prevent drilling holes for injection too shallow or too deep, or damaging existing waterstop in joints.
 - 8. Remove dust and debris in drill holes and on surface of structure resulting from drilling operation, by flushing with water prior to installing the injection packers or ports.
 - 9. Space entry ports closer together to allow adjustment of injection pressure to obtain minimum loss of epoxy to soil at locations where:
 - a. Cracks or joints extend entirely through concrete element.
 - b. Backfill of walls on one side.
 - c. Slab-on-grade.
 - d. Difficult to excavate behind wall to seal both surfaces of crack.
 - 10. Install injection packers or ports in drill holes in accordance with manufacturer's printed instructions with zerk coupling or other one-way ball or check valve, to permit testing for watertightness and acid flushing of cracks and joints.

C. Acid Flushing of Cracks and Joints:

1. Flush cracks and joints with acid flushing solution in accordance with manufacturer's printed instructions. Apply acid flushing solution for a sufficient duration to permit solution to penetrate full depth and length of cracks and joints or to waterstop in joints.
2. Following acid flushing, flush cracks and joints with copious quantities of potable water in accordance with manufacturer's printed instructions, at a pressure of 1,000 psi, or resin injection pressure, whichever is greater. until no evidence of acid flushing solution is visible in flush water.
3. Submit in-field health and safety plan for acid flushing operation. As a minimum, identify worker conducting acid flushing by wearing a reflective safety vest and signs indicating "Acid Flushing". Also, clearly identify Work area where acid flushing is underway by signs and isolate by placing orange pylons or other temporary barrier, and signs indicating "Acid Flushing". As work progresses, move pylons or barriers and signs to maintain a safe zone.

D. Application of Surface Seal along Cracks and Joints:

1. Apply surface seal in accordance with manufacturer's instructions to designated cracks and joints face prior to injection. Seal surface of cracks or joints to contain and prevent escape of injection epoxy.
2. Cure surface seal in accordance with manufacturer's printed instructions before commencing inject work.

E. Epoxy Injection:

1. Ensure zerk coupling is not installed in ports or packers next to the one being injected.
2. Start injection into each crack or joint at lowest elevation entry port or packer along vertical or diagonal crack or joint, and at one end of horizontal crack or joint.
3. Where injection entry ports or packers are used, continue injection at first port or packer until resin begins to flow out of port or packer at next highest elevation. Plug first port or packer and start injection at second port or packer until resin flows from next port or packer.
4. Inject entire crack or joint with same sequence.

5. At no time inject more than 6 feet length of first vertical crack or joint before verifying resin in sample bottle has start to set and cure.
6. Prior to commencing injection work along a horizontal crack or joint in structure when processed using ports or packers with zerk couplings are used, remove zerk couplings from injection ports or packers except for two ports or packers located where injection work will commence. Commence injection work in first two ports or packers. Once clean resin is vented from third injection port or packer, cease injection at first port or packer, and install zerk coupling and commence injection at third port or packer. Repeat process for fourth and subsequent ports or packers until full length of crack or joint has been injected.

F. Finishing:

1. Allow epoxy resin to cure in accordance with manufacturer's instruction after cracks or joints have been completely injected to allow surface seal removal without draining or runback of uncured epoxy resin material from cracks or joints.
2. Remove surface seal and injection packers or ports from cured injection resin along crack.
3. Finish crack or joint faces flush with adjacent concrete.
4. Indentations or protrusions caused by placement of entry ports, packers, drill holes, or damage from removal of surface seal is not acceptable.
5. Grind off protrusions and patch indentations and holes from injection packers and entry ports with a suitable patch material to satisfaction of Engineer.
6. Remove surplus surface seal material splatters and injection resin material runs and spills from concrete surfaces.

3.05 FIELD QUALITY CONTROL

A. Epoxy Resin Two Component Ratio Tests:

1. Disconnect mixing head and pump two resin components simultaneously through ratio check device.
2. Adjust discharge pressure to 160 psi for both resin components.
3. Simultaneously discharge both resin 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 resin 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 stop for more than 45 minutes.
6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

C. Bottled Sample Tests:

1. During injection operation, provide at least one sample of mixed epoxy resin for each injection pump per shift per injection work day in a sample bottle.
2. Provide sufficient sample to demonstrate sample material epoxy resin will set and cure correctly.
3. Label each bottled sample with Contractor's name, date, and time sample was taken, and location in structure where sample was taken. Record details of bottle sample tests.
4. Place filled sample bottle upright in a container and allow sample to cure.

5. After sample has been allowed to cure, cut bottled sample open and visually inspect contents to verify that epoxy resin material has completely reacted and cured.
6. Evaluation and Assessment of Test:
 - a. Should bottled sample(s) indicate a problem; such as epoxy resin not cured or foreign liquid in sample bottle, take verifying core sample immediately from cracks or joints, where material was used.
 - b. Should above-referenced bottle sample(s) and core sample(s) indicate a problem with epoxy resin, arrange to have a Technical Representative of the epoxy resin manufacturer come to Site to review bottled sample(s) and core drilled sample(s) with Engineer and provide technical advice on corrective measures.
 - c. Carry out further investigation work or corrective measures recommended by Technical Representative of epoxy resin manufacturer.

D. Core Sample Tests:

1. Only where required by Engineer.
2. Initial Cores:
 - a. 4-inch diameter for full crack depth along cracks or joints or to waterstop in joints 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.
 - c. Label each core with core number, location, and date when core was obtained.
3. Provide suitable containers for storage, curing, and transportation of test specimens.
4. Methods of Testing Cores:
 - a. Penetration: Visual examination.
 - b. Bond Strength/Compression Test: Concrete failure prior to resin failure.
5. Test Requirements:
 - a. Penetration: Per performance requirements.
 - b. Bond Strength (Compression Test): Per performance requirements.
6. Evaluation and Acceptance of Tests:
 - a. If initial cores pass tests as specified, epoxy resin injection work at area represented by cores will be accepted.

- b. If initial cores fail either by lack of penetration or bond strength, crack or joint 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.
7. Core Hole Repair:
- a. Correct work as result of testing upon notification from Engineer.
 - b. Refill initial and verifying core holes with a suitable repair mortar, per Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces, or Section 03 01 33, Repair of Horizontal Concrete Surfaces, tamped and rodded in-place to completely fill for full depth of core hole.
 - c. Finish surface to blend with adjacent concrete.

END OF SECTION

**SECTION 03 64 24
POLYURETHANE INJECTION GROUTING**

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. D638, Standard Test Method for Tensile Properties of Plastics.
 - b. D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - c. D1623, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - d. D3574, Standard Test Method for Flexible Cellular Material Slab, Bonded, and Molded Urethane Foams.

1.02 DEFINITIONS

- A. Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.
- B. Injection: Method of bonding together; method of addressing or eliminating leakage through cracks or joints by installing polymer under pressure to fill the void in the crack or joint.
- C. Joint: A planned and formed discontinuity in the concrete structure at the junction of adjacent and sequential concrete placements, and may contain embedded waterstops.
- D. Leak or Leakage: Crack or joint exhibiting moisture, sign of efflorescence, intermittent wet to the touch, or continuous flow of liquid.
- E. Narrow Cracks: Width equal to or less than 0.015 inch.
- F. Wide Crack: Wider than 0.015 inch.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Physical and chemical properties for polyurethane injection resin.
 - 2. Technical data for metering, mixing, and injection equipment.

3. Submit marked up drawings of proposed polyurethane injection work including locations, depth of penetration, length, materials used, and procedures.
4. Sample bottle.

B. Informational Submittals:

1. Manufacturer's recommended surface preparation procedures and application instructions for polyurethane resin injection.
2. Manufacturer's Certificate of Compliance in accordance with **Section 01 61 00, Common Product Requirements**. Certified test results for each batch of polyurethane.
3. Statements of Qualification for Polyurethane Resin Injection:
 - a. Manufacturer's Site representative.
 - b. Injection applicator.
 - c. Injection pump operating technician.
4. Health and Safety Plans for confine space entry acid flushing work.
5. Sample of polyurethane resin mix ratio and injection pressure test records for concrete crack and joint injection work.
6. Installation instructions for repairing core holes with repair mortar.
7. Polyurethane resins injection pressure test records for concrete crack and joint injection work

1.04 QUALITY ASSURANCE

A. Qualifications for Injection Staff:

1. Manufacturer's Site Representative:
 - a. Capable of instructing successful methods of polyurethane injection process for concrete structures.
 - 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 or certified by polyurethane resin manufacturer.
 - b. Minimum 3 years' experience in successful polyurethane injection for at least 10,000 linear feet of successful crack and joint injection, including 2,000 linear feet of wet crack and joint injection to stop water leakage.

1.05 PERFORMANCE REQUIREMENTS

- A. The injected polyurethane resin shall fill the cracks and joints, and in no case shall the depth of penetration of the injection material be less than 90 percent of:
 - 1. The full thickness of the concrete section for cracks.
 - 2. The depth between the waterstop and the inside face of the structure for joints.
- B. In cured state, injected polyurethane resin forms a dense rubber-like closed cell flexible foam compression gasket-type seal material.
- C. Notwithstanding the foregoing, injected cracks which exhibit leakage are considered deficient work irrespective of the depth of penetration observed in quality control core drilled samples. Reinject deficient work as required to meet the performance requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping:
 - 1. Package adhesive material in new sealed containers and label with following information:
 - a. Manufacturer's name.
 - b. Product name and lot number.
 - c. ANSI Hazard Classification (formerly SPI Classification).
 - d. ANSI recommended precautions for handling.
 - e. Mix ratio by volume for accelerator.
- B. Storage and Protection: Store polyurethane resin material containers in accordance with manufacturer's printed instructions or in the absence of such information at ambient temperatures below 110 degrees F and above 68 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Masterinject 1210 IUG.
- B. Sika Corp., Lyndhurst, NJ; SikaFix HH Hydrophilic.
- C. Euclid Chemical Co., Cleveland, OH; DURAL Aqua-Fil.
- D. Prime Resins, Inc., Conyers, GA; Prime Flex 900 XLV.

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2.02 POLYURETHANE RESIN

- A. Single-component, water-activated, hydrophilic polyurethane injection resin.
- B. Elongation: Minimum 350 percent, in accordance with ASTM D3574 or ASTM D638 test method.
- C. Tensile Strength: Minimum 150 psi, in accordance with ASTM D3574 or ASTM D638 test method.
- D. Shrinkage: Less than 2 percent.

2.03 SURFACE SEAL

- A. Provide seal with 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 resin has cured.

2.04 ACID FLUSHING SOLUTION

- A. Premixed solution of food grade phosphoric acid diluted to a 5 percent plus or minus 0.5 percent of the volume of the bottle.

2.05 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.06 SAMPLE BOTTLE

- A. 5 inches natural wide mouth HDPE bottle or 4 ounces clear PVC cylinder bottle, supplied with caps.

2.07 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of polyurethane resins.

PART 3 EXECUTION

3.01 GENERAL

- A. Use of polyurethane injection shall be limited to nonstructural locations as determined by Structural Engineer.

- B. Unless permitted otherwise, polyurethane inject cracks and joints listed below:
 - 1. Cracks and joints that leak.
 - 2. Cracks and joints exhibit dampness, efflorescence, or other evidence of leakage.
- C. Do not proceed with injection work until action submittals have been reviewed and approved by the Structural Engineer of Record.
- D. Perform injection work after performing surface preparation.
- E. The width of the cracks shown may vary along the length and through the thickness of the concrete section.
- F. Remove all excess unused polyurethane resins materials inside the structure prior to the end of the work.

3.02 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter mixed components, and inject mixture into crack or joint.
- B. Pumps:
 - 1. Positive displacement type pump.
 - 2. Equip the polyurethane injection equipment with pail heater(s) suitable for plastic pails capable of maintaining the polyurethane resin and accelerator mixture between 50 degrees F and 160 degrees F.
 - 3. A thermometer with each pump for monitoring the temperature of the polyurethane resin.
- C. Discharge Pressure: Automatic pressure controls capable of discharging mixed polyurethane resin at pressures in accordance with polyurethane resin manufacturer's printed instructions, and able to maintain such pressure.
- D. Proportioning Ratio Tolerance: Maintain polyurethane manufacturer's prescribed mix ratio within a tolerance in accordance with polyurethane resin manufacturer's printed instructions.
- E. Pressure gauge capable of sensing pressure behind valve.

3.03 PREPARATION

- A. Free cracks and joints from loose matter, dirt, laitance, oil, grease, salt, and other contaminants.
- B. Clean cracks and joints in accordance with polyurethane resins manufacturer's printed instructions.
- C. Clean surfaces adjacent to cracks and joints from dirt, dust, grease, oil, efflorescence, encrustation, and other foreign matter detrimental to bond of surface seal system and to expose the full extent of cracks and joints in accordance with manufacturer's printed instructions.
- D. Do not use acids and corrosives for cleaning, other than those specified herein, unless neutralized prior to injecting polyurethane resin.
- E. During installation and curing of materials, if the ambient temperature is expected to drop below the manufacturer's recommended minimum temperature, provide enclosures and heat as required.
- F. Provide work platforms as required.

3.04 APPLICATION

- A. Injection Ports:
 - 1. Drill holes shall be installed along cracks and joints designated for injection as required to meet the performance requirements for injection.
 - 2. The requirements for installing drill holes for injection provided below represent acceptable minimum standards of practice.
 - 3. Drill holes for injection at an angle between 45 degrees and 60 degrees from the surface of the concrete and perpendicular to the cracks or joints alignment, to intersect the cracks at the midpoint of the concrete section, and intersect the joints at the midpoint between the waterstop and interior concrete surface, except as noted otherwise.
 - 4. Locate drill holes on alternate sides of the crack or joint where possible, unless orientation of the crack or joint is known or has been verified by nondestructive testing techniques or core drilling.
 - 5. The spacing of drill holes not to exceed the concrete thickness or 12 inches (maximum), except as noted otherwise.
 - 6. Adjust location and angle of drill holes to suit orientation of crack or joint and at required angle, such as using a template, during the Work especially at the commencement of drilling holes for injection and at the beginning of each subsequent shift.

7. Take measures to prevent drilling holes for injection too shallow, or too deep, and/or damaging the existing waterstop in the joints. Shallow hole injections lead to concrete spalls. Repair spalls at Contractor's expense.
8. Remove dust and debris in drill holes and on interior surface of the structure resulting from drilling operation, by flushing with water prior to installing injection packers or ports.
9. Install injection packers or ports in drill holes in accordance with manufacturer's printed instructions with zerk coupling, or other one-way ball or check valve, to permit testing for watertightness and acid flushing of cracks and joints.

B. Acid Flushing of Cracks and Joints:

1. Flush the cracks and joints with the acid flushing solution in accordance with manufacturer's printed instructions. Apply the acid flushing solution for a sufficient duration to permit the acid flushing solution to penetrate the full depth and length of the cracks or joints. or to the waterstop in joints.
2. Following the acid flushing, flush the cracks and joints with copious quantities of potable water in accordance with manufacturer's printed instructions until there is no more evidence of acid flushing solution visible in the flush water.
3. Submit in-field health and safety plan for this operation. As a minimum submit:
 - a. Identify the worker who is carrying out the acid flushing operations by wearing a reflective safety vest and signs indicating "Acid Flushing".
 - b. Clearly identify the portion of the work area where acid flushing is being carried out by signs and isolated by placing orange pylons, or other temporary barriers, and signs indicating "Acid Flushing". As work progresses, move the pylons or barriers and signs to maintain a safe zone.

C. Application of Surface Seal Along Cracks and Joints:

1. Apply surface seal along the length of the cracks and joints designated for injection on the top side and underside of slabs, or both sides of walls, where possible in order to contain, confine, and prevent escape of the injected polyurethane resin, in accordance with manufacturer's printed instructions.
2. Cure the surface seal in accordance with the material's manufacturer's printed instructions.

D. Mixing Polyurethane Injection Resin:

1. Add accelerator to polyurethane injection resin at the required dosage to produce cured polyurethane material meeting performance requirements, and mix thoroughly in accordance with manufacturer's printed instructions until a homogeneous mixture is obtained outside of the structure.
2. Heat polyurethane injection resin materials prior to and during mixing and injection as required and in accordance with manufacturer's printed instructions to a temperature between 85 degrees F and 130 degrees F. Injection of polyurethane resin when it is less than 85 degrees F or more than 130 degrees F is prohibited.

E. Polyurethane Injection of Cracks and Joints:

1. Inject polyurethane resins, mixed with accelerator or in a neat form, into cracks and joints in a sequential manner, and reinjection as required, to meet the performance requirements.
2. Start injection into each crack or joint at lowest elevation entry port for vertical or diagonal cracks and joints and at one end for horizontal cracks and joints in vertical structure. Continue injection at first port until pure uncontaminated resin begins to flow out of next port. Plug first port and start injection at second port until polyurethane resin flows from next port. Inject crack or joint in a sequential manner until the full length of the crack or joint has been injected. At no time inject more than 6 feet length of vertical crack or joint before verifying that the first 12 inches of injected crack or joint is set and cured.
3. Prior to commencing the injection work along a crack or joint in horizontal structure when packers with zerk couplings are used, remove the zerk couplings from the injection packers or ports except for the two packers located where the injection work will commence. Commence injection work in the first two packers. Once clean resin is vented from the third injection packer, cease injection at the first packer, and install the zerk coupling and commence injection at the third packer. Repeat the process for the fourth and subsequent packers until the full length of the crack or joint has been injected.

F. Finishing:

1. Cure polyurethane resins after crack or joints has been completely filled without draining or runback of polyurethane resin material from crack or joints.
2. Remove surface seal and injection packers or ports from along the crack or joints.
3. Finish surface flush and to match surrounding concrete.

4. Indentations or protrusions caused by placement of entry ports drill holes, or damage from removal of surface seal, is not acceptable.
5. Grind off protrusions, and patch indentations and holes from packers and ports with a suitable patch material to the satisfaction of the Engineer.
6. Remove surplus surface seal material on splatters and injection material runs and spills from concrete surfaces.

3.05 FIELD QUALITY CONTROL

A. Injection Pressure Test:

1. Disconnect mixing head of injection equipment and connect polyurethane component delivery line 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 has stopped for more than 45 minutes.
6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

B. Bottled Samples:

1. During the injection operation, provide at least one sample of the mixed polyurethane injection resins per shift per injection pump in a sample bottle.
2. Half fill each sample bottle, containing a small amount of water (5 percent by volume) with polyurethane injection resin material from the pump discharge hose. Swirl or lightly shake sample to thoroughly mix resin with the water. When foaming rises near the top of the bottle, install the cap to contain the expanding resin material.
3. Label each bottled sample with Contractor's name, date and time sample was taken, and location in structure where sample was taken. Maintain a log of bottle samples.
4. Place filled sample bottle upright in a box or pail and allow sample to cure.

5. After sample cured, cut bottled sample open and visually inspect contents to verify that polyurethane injection resins material has completely reacted and cured.
6. Evaluation and Assessment of Test:
 - a. If a bottled sample(s) indicates a problem with the polyurethane injection resins, such as polyurethane resin not cured; take verifying core sample immediately from the cracks or joints, where the material was used.
 - b. If the above-referenced bottle sample(s) and core sample(s) indicate a problem with the polyurethane injection resins, have a Technical Representative of the polyurethane injection resins manufacturer come to site to review bottled sample(s) and core drilled sample(s) with Engineer and provide technical advice on corrective measures.
 - c. Carry out further investigation work or corrective measures recommended by the Technical Representative of the polyurethane injection resins manufacturer.

END OF SECTION

**SECTION 04 21 13.13
MASONRY VENEER**

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. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - c. B370, Standard Specification for Copper Sheet and Strip for Building Construction.
 - d. C90, Standard Specification for Loadbearing Concrete Masonry Units.
 - e. C91, Standard Specification for Masonry Cement.
 - f. C144, Standard Specification for Aggregate for Masonry Mortar.
 - g. C150/C150M, Standard Specification for Portland Cement.
 - h. C207, Standard Specification for Hydrated Lime for Masonry Purposes.
 - i. C216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
 - j. C270, Standard Specification for Mortar for Unit Masonry.
 - k. C979/C979M, Standard Specification for Pigments for Integrally Colored Concrete.
 - l. D1056, Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
 - m. E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.
 - n. E2178, Standard Test Method for Air Permeance of Building Materials.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Manufacturer's product information for each different item specified.
 - b. Mix designs for mortar.
 - c. Details for cast stone units and special brick shapes and assemblies.

2. Samples:
 - a. Full-size units for each different exposed masonry unit and precast sill required showing full range of exposed color, texture, and dimensions to be expected in completed construction. Match selected Samples at Engineer's office or listed in Finish Schedule.
 - 1) Include size variation data verifying that actual range of sizes for brick falls within ASTM C216 dimension tolerances for brick where modular dimensioning is indicated.
 - b. Colored masonry mortar Samples for each color required showing full range of colors expected in finished construction. Label Samples to indicate type and amount of colorant used.
 - c. Accessories embedded in masonry.

B. Informational Submittals:

1. Experience record of mortar color pigment proposed for use.
2. Manufacturer's certificate of compliance for masonry units specified herein.
3. Method and materials for removal of efflorescence.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: For masonry construction meet requirements of the International Building Code and as supplemented by these Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection:

1. Store all masonry materials off ground and protected from precipitation.
2. Protect veneer materials from mud splatters and staining.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not lay masonry when ambient temperature is below 32 degrees F on a rising temperature or below 40 degrees F on a falling temperature, or when there is a probability of such conditions occurring within 48 hours, unless express approval of Engineer is obtained. In such case, make special provisions for heating materials and protecting finished Work. Protect masonry against freezing for a minimum of 48 hours after being laid. Protect tops of walls from precipitation at all times. Cover with waterproof paper when rain or snow is imminent and the Work is discontinued.
- B. Humidity: Protect masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 99 degrees F (37 degrees C) in the shade with relative humidity less than 50 percent.

PART 2 PRODUCTS

2.01 MASONRY UNITS

- A. Color, Texture, and Pattern: Match submitted Samples approved by Engineer.

- B. Facing Brick:
 - 1. ASTM C216, Grade SW, Type FBX. Minimum compressive strength for individual brick, 2,500 psi.
 - 2. Nominal Size: 4 inches by 2-2/3 inches by 8 inches.
 - 3. Color of Units: Match existing.

- C. Precast Integrally Colored Concrete Sill:
 - 1. Design Mix: 2 parts gravel, 2 parts concrete sand, and 1 part cement.
 - 2. Cement: Portland cement Type I/II gray or white conforming to ASTM C150.
 - 3. Course Aggregate:
 - a. Graded and washed gravel or stone conforming to ASTM C33.
 - b. Gravel not to exceed 3/8 inch.
 - 4. Fine Aggregate: Graded and washed natural concrete sand conforming to ASTM C33.
 - 5. Color:
 - a. Bayferrox inorganic, synthetic iron oxide pigments, lime proof, and non-fading, conforming to ASTM C979.
 - b. Amount of pigment shall not exceed 10 percent by weight of the cement used.
 - 6. Admixtures: ASTM C494.
 - 7. Water: Potable water free from impurities.
 - 8. Air Entrainment: Conform to ASTM C260.
 - 9. Reinforcing Steel: M13 No. 4, Grade 60 rebar, and 1/4-inch HR round steel conforming to ASTM A615.
 - 10. Strength: Comprehensive strength of 4,000 to 6,000 psi at age 28 days as determined by tests of 6-inch cylinders.

2.02 MORTAR MATERIALS

- A. Masonry Cement: ASTM C91, low alkali content (0.03 percent maximum).

- B. Portland Cement: ASTM C150, Type I, low alkali content (0.60 percent maximum).

- C. Lime: ASTM C207, Type S.

- D. Mortar: ASTM C270, Type S. Consisting of one part portland cement, from 1/4 part to 1/2 part lime putty or hydrated lime, and clean well-graded sand in the proportion of three times the sum of the cementitious material; or 1/2 part portland cement, one part masonry cement, and clean well-graded sand in the proportion of three times the sum of the cementitious material.
 - 1. If color is added, add in a consistent manner to provide final uniformity.
 - 2. No antifreeze liquid, salts, or other substances are allowed to lower freezing point. No calcium chloride is allowed in mortar.
- E. Tuck-Pointing Mortar: Prehydrated Type N, one part portland cement, one part Type S hydrated lime, and six parts sand, by volume.
- F. Mortar Color:
 - 1. Pure, concentrated mineral, pigment specially processed for mixing in to mortar; ASTM C979.
 - 2. Manufacturer and Product:
 - a. Davis Colors, True Tone Cement Colors.
 - b. Solomon Colors, Mortar Colors.
 - 3. Color: Match Existing.
- G. Sand: ASTM C144, in addition not less than 5 percent passes the No. 100 sieve.
- H. Water: Fresh, clean, and free of deleterious acids, alkalies, chlorides, and organic materials.

2.03 MORTAR PREPARATION

- A. Place one-half the water and aggregate in operating mixer; add cement; add remaining aggregate and water and mix for at least 2 minutes. Add lime and continue mixing as long as needed to secure a uniform mass, but no less than 3 minutes after the addition of lime. Time the addition of admixture in strict accordance with manufacturer's instructions and the procedure used for adding it to the mix shall provide good dispersion.
- B. Mix mortar in machine with mixing drums clean and free of debris and dried mortar. Use mortar before the initial setting of the cement has taken place. Do not retemper mortar in which the cement has started to set.
- C. Retemper mortar boards by adding water within a basin formed with the mortar and the mortar reworked into the water. Dashing or pouring water over mortar and retempering of harsh, nonplastic mortar is not permitted.
- D. Where color tinting of mortar is required, add sufficient lime-proof color-fast mineral pigment to mortar.

2.04 MASONRY CONTROL JOINTS

- A. ASTM D1056, closed cell neoprene sponge, 3 inches wide by 3/8 inch thick.

2.05 COMPRESSIBLE PADS

- A. ASTM D1056, closed cell neoprene sponge, 3 inches wide by 1/4 inch thick, with pressure sensitive adhesive applied on one side.

2.06 THROUGH-WALL FLASHING

- A. Copper:
 - 1. Bonded on both sides with waterproofed creped kraft paper.
 - 2. Copper Weight: 3 ounces per square foot.
 - 3. Manufacturers and Products:
 - a. AFCO Products, Inc.; AFCO Cop-A-Bond Duplex.
 - b. York Manufacturing, Inc.; Cop-R-Tex Duplex.

2.07 CAVITY WEEPS

- A. Weep Vents:
 - 1. Honeycomb, polypropylene; 3/8 inch by size of head joint; match color of mortar.
 - 2. Manufacturers and Products:
 - a. Hohmann and Barnard; QV Quadro Vent.
 - b. Wire-Bond; 3601 Cell Vent.

2.08 MASONRY ACCESSORIES AND ANCILLARY MATERIALS

- A. Manufacturers, unless noted otherwise:
 - 1. Hohmann and Barnard, Inc.
 - 2. Heckmann Building Products.
- B. Horizontal Joint Reinforcement and Veneer Anchors: See Specification Section 04 22 00, Concrete Unit Masonry.
- C. Masonry Mat:
 - 1. Description: Air space maintenance and drainage material of fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100 percent recycled plastic with binder. Mat is to be a non-woven textile product in random pattern and have voids no greater than 1/4 inch in diameter.

2. Thickness: Select masonry mat thickness of 1 inch to allow no more than 3/8 inch tolerance between the mat and masonry veneer wythe.
3. Size: 16 inches by 8 feet.
4. Manufacturers and Products: Archovations, Inc., Hudson, WI; CavClear Masonry Mat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of masonry veneer.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 GENERAL INSTALLATION

- A. Provide or cut special shapes for corners, jambs, lintels, and other areas as shown or as required. Match color and texture of standard units.
- B. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- C. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.
- D. Anchoring:
 1. Anchor all veneer types to structural backing wall or to structural columns as shown on Drawings and in conformance to the International Building Code.
 2. Maintain a space not less than 1 inch wide between masonry wall and concrete members.
 3. Keep space free of mortar or other rigid material to permit differential movement between backing wall and masonry.
 4. Attach veneer to backing with anchor ties.
 - a. Use one anchor tie for each 1.77 square feet of wall area.
 - b. Maximum Space between Adjacent Ties:
 - 1) Vertically: 24 inches.
 - 2) Horizontally: 32 inches.
 - c. Embed ties at least 2 inches in horizontal joint of veneer.

- d. Provide additional ties at openings:
 - 1) Maximum Spacing Around Perimeter: 24 inches.
 - 2) Install within 12 inches of opening.

3.03 MASONRY VENEER WALL CONSTRUCTION—GENERAL

- A. Mortar Beds: Lay masonry with full mortar coverage on horizontal and vertical joints. Rock closures into place with head joints thrown against two adjacent units in-place. Do not pound corners or jambs to fit stretcher units after setting in-place. Where adjustment to corners or jambs must be made after mortar has started to set, remove mortar and replace with fresh mortar.
- B. Horizontal and Vertical Face Joints:
 1. Nominal Thickness: 3/8 inch.
 2. Construct uniform joints.
 3. Shove vertical joints tight.
 4. Tool joints concave in exposed surfaces when thumbprint hard using jointing tool.
 5. Concave tool exterior joints below grade.
 6. Flush cut all joints not tooled.
 7. Fill horizontal joints between top of masonry partition and underside of concrete beams with mortar.
- C. Tuck-Point Joints:
 1. Rake mortar joints to a depth of 1/2 inch to 3/4 inch.
 2. Saturate exposed joints with clean water.
 3. Fill joints solidly with pointing mortar.
 4. Tool joints to match existing.
- D. Movement Joints: Keep clean of all mortar and debris.
- E. Masonry Control Joints:
 1. Provide continuous vertical control joints in masonry as shown on Drawings.
 2. Omit mortar from vertical joints. Place control joint material as wall is built.
- F. Through-Wall Flashing:
 1. Place flashing on bed of mortar.
 2. Lap cross joints of through-wall flashing at least 2 inches.
 3. Extend flashing beyond exterior face of wall and provide drip edge.
 4. Cover flashing with mortar.

- G. Flashing: Clean surface of masonry smooth and free from projections that might puncture, gouge, or otherwise damage flashing material.
- H. Weep Vents: Provide weep vents in head joints in first course immediately above all flashing leaving head joint free and clean of mortar.
 - 1. Maximum Spacing: 24 inches OC.
 - 2. Keep weep holes and area above flashing free of mortar droppings.
- I. Sealant Joints:
 - 1. Retain sealant joints around outside perimeters of exterior doors, window frames, and other wall openings:
 - a. Uniform Depth: 3/4 inch.
 - b. Uniform Width: 1/4 inch.
- J. Pointing: Cut out defective joints and holes in exposed masonry and repoint with mortar. Dry brush masonry surface after mortar has set at end of each day's Work and after final pointing.

3.04 BRICK VENEER INSTALLATION

- A. General: Do not install cracked, broken, or chipped masonry units exceeding ASTM C216 allowances. Thoroughly wet brick just before laying except in freezing weather where bricks are laid dry. Prewetting may also be omitted if the brick at the time of laying has a rate of absorption not exceeding 0.025 ounce of water per square inch of surface after being placed in 1/8 inch of water for 1 minute.
 - 1. Coordinate installation with backup walls, through wall flashing, and other construction. Use masonry saws to cut and fit exposed units. Lay brick plumb, true to line, with level courses accurately spaced, and do not furrow bed joints.
 - 2. Finish horizontal run by racking back in each course; toothing not permitted. Adjust all units to final position while mortar is soft and plastic. If units are displaced after mortar has stiffened, remove, clean joints and units of mortar, and relay with fresh mortar.
 - 3. Bond unexposed units in wythe by lapping a minimum of 2 inches. Adjust shelf angles to keep Work level at proper elevation. Provide pressure relieving joints by placing a continuous compressible pad under the shelf angle.
 - 4. When joining fresh masonry to set or partially set masonry:
 - a. Remove loose brick and mortar.
 - b. Clean and lightly wet exposed surface of set masonry prior to laying fresh masonry.
- B. Pattern: Lay brick in running bond.

3.05 CLEANING

- A. Cleaning Agents:
 - 1. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in 1 gallon of water.
- B. Follow masonry and mortar color manufacturer's recommendations for use of cleaning agents.
- C. Application:
 - 1. Thoroughly wet surface of masonry on which no efflorescence appears before using cleaning agent.
 - 2. Scrub with acceptable cleaning agent.
 - 3. Immediately rinse with clean water.
 - 4. Work small sections at a time.
 - 5. Work from top to bottom.
 - 6. Protect sash, metal lintels, and other materials, which may corrode when masonry is cleaned with acid solution.
 - 7. Remove efflorescence in accordance with masonry manufacturer's recommendations.
- D. Leave Work area and surrounding surfaces clean and free of mortar spots, droppings, and broken masonry.

3.06 FIELD QUALITY CONTROL AND QUALITY CONTROL

- A. At least once a week while installation of masonry veneer is in progress, take mortar Samples for testing. Continue on that basis for duration of installation of masonry veneer at discretion of Engineer.
- B. Take Samples in accordance with ASTM C270.
- C. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- D. Contractor-Furnished Quality Control: Inspect and test as required in Section 01 45 16.13, Contractor Quality Control.

3.07 PROTECTION

- A. Wall Covering: During erection, cover top of wall with strong waterproof membrane at end of each day or shutdown and as follows:
 - 1. Cover partially completed walls when Work is not in progress.
 - 2. Extend cover minimum of 24 inches down both sides.
 - 3. Hold cover securely in-place.

- B. Protect sills, ledges, and offsets from mortar drippings or other damage during construction. Remove misplaced mortar immediately. Protect face materials against staining. Protect the door jambs and corners from damage during construction.

END OF SECTION

SECTION 04 22 00
CONCRETE UNIT MASONRY

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): 530.1/ASCE 6/TMS 602, Building Code Requirements for Masonry Structures and Specifications for Masonry Structures and Related Commentaries.
 2. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 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.
 - c. C33, Standard Specification for Concrete Aggregates.
 - d. C90, Standard Specification for Loadbearing Concrete Masonry Units.
 - e. C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - f. C144, Standard Specification for Aggregate for Masonry Mortar.
 - g. C150, Standard Specification for Portland Cement.
 - h. C207, Standard Specification for Hydrated Lime for Masonry Purposes.
 - i. C216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
 - j. C270, Standard Specification for Mortar for Unit Masonry.
 - k. C404, Standard Specification for Aggregates for Masonry Grout.
 - l. C476, Standard Specification for Grout for Masonry.
 - m. C1314, Standard Test Method for Compressive Strength of Masonry Prisms.
 - n. E514, Standard Test Method for Water Penetration and Leakage through Masonry.
 3. ICC Evaluation Service (ICC-ES) Reports.
 4. International Building Code.
 5. National Concrete Masonry Association (NCMA).

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Information illustrating horizontal joint reinforcement and preformed control joint materials proposed.
 - b. Grout proportions.
 - c. Mortar proportions.
 - d. Letter of certification stating grout aggregates and mortar sand meet requirements of ASTM C33, including nonreactivity.
2. Samples:
 - a. Two of each type of masonry unit to be used on Project for selection of color and texture.
 - b. Mortar colors for color selection.

B. Informational Submittals:

1. Method of placing grout.
2. Certified field test results within 5 days of performing specified tests.
3. Letter of certification from masonry unit manufacturer stating that units comply with FBC Table 2105.2.2.1.2.
4. Letter from water repellent admixture manufacturer verifying masonry unit manufacturer's proper use of product.
5. Method and materials for removal of efflorescence.

1.03 QUALITY ASSURANCE

A. Masonry Unit Manufacturer: Qualified by manufacturer of water repellent admixture to use product.

B. Mockups:

1. Lay up Sample panel for each type of masonry at Site.
2. Dimensions: Minimum 4 feet high by 4 feet long.
3. Leave intact after approval until acceptance of permanent masonry work and then remove.
4. Approved panels shall serve as basis of color, texture, bond, quality of finished joints, and for acceptance of permanent construction.
5. Demonstrate ability to keep insulation and grout isolated and in certain cells during any sequence of placement, and to demonstrate materials will be restricted to cells and bond beams intended to receive each material.
6. Construction shall show areas required to receive mortar, including webs on each side of each cell to prevent insulation from entering cells to receive grout or to prevent grout from entering cells to receive insulation.

7. Where bond beams are to be used, demonstrate proper placement of both insulation and grout to bond beam level, and proper placement of bond beam prior to placement of insulation and grout above bond beam level.
 8. Demonstrate proper use of running bond or stacked bond.
- C. Comply with the requirements and criteria of the NCMA, ASTM C90, ASTM C216, and ACI 530.1 for masonry finish and appearance, dimension tolerances, tolerances of construction, joint tolerances, and wall plumb tolerances.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Keep lime and other ingredients dry.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not lay masonry when ambient temperature is below 32 degrees F on a rising temperature, or below 40 degrees F on a falling temperature, or when there is a probability of such conditions occurring within 48 hours, unless written approval of procedures for protection from freezing is obtained from Engineer.
- B. Moisture Protection: Protect masonry construction from loss of moisture during curing period of 7 days when ambient air temperature is 90 degrees F or greater and when relative humidity is less than 50 percent.

PART 2 PRODUCTS

2.01 COMPRESSIVE STRENGTH OF MASONRY

- A. Minimum 28-Day Compressive Field Strength (f'_m) of Completed Assemblage: 1,500 psi.

2.02 MASONRY UNITS

- A. General:
1. Furnish or cut special shapes for corners, jambs, lintels, and other areas shown or required.
 2. Special units shall match color and texture of standard units.
 3. Where units are placed so end of unit is exposed, such as at a corner or intersection, exposed end of that block shall have surface to match color and texture of sides of other units.
 4. Furnish sound, dry, clean units free of cracks, prior to placing in structure.

5. Vertical Cells to be Grouted: Capable of alignment sufficient to maintain clear, unobstructed continuous vertical cell dimensions in accordance with ACI 530.1, Table 7.
6. Masonry unit size and shape shall allow for all placement patterns to prevent materials, such as grout or poured insulation, from escaping from cell being filled to adjacent cells where material is not intended to be placed.

B. Concrete Masonry Units (CMU):

1. ASTM C90: Normal weight.
2. Water Repellent Admixture:
 - a. Structural concrete masonry units in weather exposed exterior wall shall be manufactured with integral liquid polymeric admixture to provide resistance to water penetration.
 - b. Manufacturer and Product: W.R. Grace & Co.; Dry-Block Block Admixture.
3. Nominal Size: 16 inches long by 8 inches high by thickness shown on Drawings.
4. Compressive Strength: 1,900 psi minimum, in accordance with ASTM C90, Table 2.
5. Color of Units: Natural.
6. Surface Texture: Smooth.

2.03 MORTAR AND GROUT MATERIALS

- A. Cement: ASTM C150, Type I or II, portland cement.
- B. Lime: ASTM C207, Type S hydrated.
- C. Aggregates:
 1. Mortar: ASTM C144, sand.
 2. Grout: ASTM C404.
- D. Water: Fresh, clean, and potable.
- E. Mortar Plasticizer Admixture:
 1. May be used instead of lime.
 2. Manufacturer and Product: American Colloid Co.; Easy/Spred Plasticizer.

- F. Water Repellent Admixture: Mortar for structural concrete masonry units in weather exposed exterior walls shall include an integral liquid polymeric admixture to provide resistance to water penetration.
- G. Grout Admixture:
 - 1. Controlled expansion additive.
 - 2. Manufacturer and Product: Sika Corporation, Lyndhurst, NJ; Grout Aid.

2.04 REINFORCEMENT

- A. Deformed Bars: As specified in Section 03 30 00, Cast-in-Place Concrete.
- B. Horizontal Joint Reinforcement and Veneer Anchors:
 - 1. Two parallel No. 9 wires, weld connected to No. 9 perpendicular cross wire and double adjustable anchor tie loops at 16 inches on center, hot-dip galvanized after fabrication in accordance with ASTM A153/A153M Class B.
 - 2. Adjustable Anchor Ties:
 - a. ASTM A1008/A1008M carbon steel sheet metal anchor tie plates, hot-dip galvanized after fabrication in accordance with ASTM A153/A153M Class B.
 - b. Horizontal masonry veneer wire: Single No. 9 wire, hot-dip galvanized after fabrication in accordance with ASTM A153/A153M Class B.
 - 3. Reinforcement: Clean and free from loose rust, scale, and any coatings that reduce bond.
 - 4. Furnish special manufactured corner and wall intersection pieces at these locations.
 - 5. Manufacturer and Product: Hohmann & Barnard, Inc., Hauppauge, NY; 285 Grip-Lok Ladder.

2.05 PREFORMED CONTROL JOINTS

- A. Solid rubber cross-shape extrusions as manufactured by:
 - 1. Sonneborn-Contech Co., Oakland, CA; Sonneborn Control Joint.
 - 2. Hohmann and Barnard, Inc.; #RS-Standard.

2.06 MORTAR MIXES

- A. Minimum average mortar 28-day compressive strength 1,800 psi.
- B. Proportions:
 - 1. In accordance with ASTM C270, Type S.
 - 2. Mortar plasticizer admixture may be substituted for lime. Batch in accordance with ICC Current Reports for specified mortar type and strength.
- C. Mixing:
 - 1. Machine mix in approved mixers.
 - 2. Keep mixer drums clean and free of debris and dried mortar.
 - 3. Mix by placing 1/2 water and 1/2 aggregate in operating mixer.
 - 4. Add cement.
 - 5. Add remaining aggregate and water and mix for at least 2 minutes.
 - 6. Add lime and continue mixing as long as needed to secure a uniform mass, but no less than 3 minutes after addition of lime.
 - 7. Time addition of admixture in accordance with manufacturer's instructions. Procedure used for adding it to mix shall provide good dispersion.
 - 8. Follow manufacturer's instructions for mortar plasticizer admixture.
 - 9. Follow manufacturer's instructions for water repellent admixture.
 - 10. Review compatibility with other mortar admixture.

2.07 GROUT MIXES

- A. Proportions: Conform to ASTM C476 for coarse grout and as follows:
 - 1. Compressive Strength: Minimum 2,000 psi at 28 days.
 - 2. For Pouring: Fluid consistency (suitable for pouring without segregation) meeting requirements of ASTM C476.
 - 3. For Pumping: Fluid consistency with minimum seven sacks of cement in each cubic yard.
- B. Mixing:
 - 1. Onsite: Follow procedure specified in Article Mortar Production.
 - 2. Transit-Mixed Grout: Meet requirements of ASTM C476.
 - 3. Add approved grout expansion admixture in accordance with manufacturer's recommendations. Premix admixture with water and add resulting solution to grout mix and thoroughly mix. Do not exceed quantity of admixture recommended by manufacturer.

PART 3 EXECUTION

3.01 GENERAL

- A. Protect masonry construction to prevent efflorescence. Provide measures to prevent moisture from entering incomplete walls.

3.02 PREPARATION

- A. Prepare surface contact area of foundation concrete for initial mortar placement by one of following methods:
 - 1. Sandblasting foundation and reinforcing dowels after concrete has fully cured to remove laitance and spillage and to expose sound aggregate.
 - 2. Water blasting foundation and reinforcing dowels after concrete has partially cured to remove laitance and spillage and to expose sound aggregate.
 - 3. Green cutting fresh concrete with high pressure water and hand tools to remove laitance and spillage from foundation and reinforcing dowels and to expose sound aggregate.
- B. Clean surfaces of loose material prior to initial mortar placement.
- C. Prevent surface damage to foundation concrete that will be exposed to view outside of contact area.

3.03 LAYING MASONRY UNITS

- A. General:
 - 1. Conform to building code applicable to this Project and as supplemented by these Specifications.
 - 2. Do not start laying masonry units unless foundation wall is plumb within 1/4 inch in 10 feet or not straight within 5/16 inch in 10 feet.
 - 3. Finish Tolerances (Measured on Interior Surfaces):
 - a. Maximum permissible variation from plumb of masonry wall or of line of joints in masonry wall: 1/16 inch per foot of height and 1/4 inch in total height of wall.
 - b. Maximum permissible variation from horizontal line along base of wall or for lines of horizontal joints: 1/16 inch per block and 1/4 inch per 50 feet of wall with proportionately greater tolerance for longer walls up to 1/2 inch in total length of wall.
 - 4. Place units with chipped edges or corners such that chipped area is not exposed to view.

B. Wall Units:

1. General:
 - a. If necessary to move a unit after once set in-place, remove from wall, clean, and set in fresh mortar.
 - b. Tothing of masonry units is not permitted.
2. Running Bond:
 - a. Lay up walls in straight, level, and uniform courses using a running bond pattern.
 - b. Place units for continuous vertical cells and mortar joints to prevent materials, such as grout or poured insulation, from escaping from cell being filled to adjacent cells where material is not intended to be placed.
3. Glazed Concrete Masonry Units:
 - a. Single-faced units may be installed through wall where walls or partitions are shown to have glazed masonry unit finish on one side only.
 - b. Use facing for dimensional and plane reference in installation.
 - c. Where glazed masonry unit finish is indicated on both sides of a wall or partition, install coved bases of two-unit construction or two-faced units through the wall.
 - d. Install coved bases flush with finished surfaces above, except as otherwise specified.
4. Corners: Lay standard masonry bond for overlapping units and grout solid.
5. Intersecting Walls: Bond with reinforcement, not with masonry bond.

C. Special Shapes:

1. Provide and place such special units as corner block, doorjamb block, lintel block fillers, and similar blocks as may be required.
2. Use required shapes and sizes to work to corners and openings, maintaining proper bond throughout wall.

3.04 BUILT-IN ITEMS

- A. Position door frames, windows, vents, louvers, and other items to be built in wall, and construct wall around them.
- B. Install masonry anchors to secure items to wall.
- C. Fill spaces around items with mortar or grout.
- D. Do not place electrical, instrumentation, or water conduits in a cell containing reinforcement, unless approved in writing by Engineer. Pipes, sleeves, and conduits shall not be placed closer than three diameters, center-to-center, nor shall they impair strength of construction.

3.05 MORTAR JOINTS

A. General:

1. Straight, clean, with uniform thickness of 3/8 inch.
2. Horizontal and vertical mortar joints shall have full mortar coverage on face shells.
3. Vertical Head Joints:
 - a. Butter well on each unit for a width equal to face shell of unit, shove tightly so mortar bonds well to both units.
 - b. Solidly fill joints from face of block to at least depth of face shell.
4. As units are laid, remove excess mortar from grout space of cells to be filled.
5. Place mortar before initial setting of cement takes place. Do not retemper mortar that has started to set or is not used within one hour. Retempering of colored mortar is not allowed.
6. Remove mortar containing water repellent admixture from face of masonry, before it sets.

B. Exposed Joints:

1. Tool joints exposed to view after final construction, unless otherwise noted or shown.
2. Cut joints flush and as mortar takes its initial set tool to provide a concave joint.
3. Perform tooling with tool that compacts mortar, pressing excess mortar out
4. Perform tooling when mortar is partially set but still sufficiently plastic to bond rather than dragging it out.
5. Rake out joints that are not tight at time of tooling, point, and then tool.
6. Rake and tool joints at split-face surfaces, interior and exterior.

C. Concealed Joints: Strike flush with no further treatment required.

3.06 CONTROL JOINTS

A. Preformed Control Joints:

1. Omit mortar from vertical joints.
2. Place rubber control joint material as wall is built.
3. After wall is grouted, cured, and cleaned, install backing rod and sealant as specified in Section 07 92 00, Joint Sealants.
4. Place and tool sealant to match depth of typical joint.

3.07 REINFORCING

A. Foundation Dowels:

1. Size, number, and location of foundation dowels shall match vertical wall reinforcing, unless otherwise noted.
2. When foundation dowel does not line up as intended, with vertical core, do not slope more than 1 horizontal to 6 vertical to bring it into alignment.

B. Vertical Reinforcing:

1. Use deformed bars.
2. Hold in position near the ends of bars by wire ties to dowels or by reinforcing positioners.
3. Lap reinforcing bars as shown, where spliced and wire tie together.
4. Minimum Bar Clearance: One bar diameter from masonry and from additional parallel bars in same grout space.
5. Hold in position at maximum intervals of 160 bar diameters by reinforcing positioners.

C. Horizontal Reinforcing:

1. Use deformed bars.
2. Lay on webs of bond beam units and place as wall is built.
3. Lap reinforcing bars as shown, where spliced and wire tie together.
4. Minimum Bar Clearance: One bar diameter from masonry and from additional parallel bars in same grout space.
5. Terminate reinforcing bars 2 inches clear from control joints as shown.

D. Horizontal Joint Reinforcement:

1. Provide in addition to typical wall reinforcing steel.
2. Space maximum 16 inches apart, vertically unless noted otherwise
3. Space maximum 8 inches apart in parapet wall.
4. Lap ends 6 inches minimum.
5. At control joints make reinforcement discontinuous.
6. Use manufactured corner and other wall intersection pieces.

3.08 MORTAR PRODUCTION

A. General:

1. Mix ingredients 3 minutes to 5 minutes after all ingredients are introduced.
2. Provide volumetric control by using batching box or similar measuring device. Do not use shovel to introduce materials directly into batch.
3. Keep sand damp and loose.
4. Use cool mix water.

3.09 GROUTING

A. General:

1. Do not mix, convey, or place with equipment constructed of aluminum.
2. Secure vertical and horizontal reinforcement, ties, bolts, anchors, and other required embedments in place; inspect and verify before placing grout.
3. Grout beams over openings in one continuous operation.
4. Maintain vertical alignment in cells to provide a clear, unobstructed, continuous vertical cell measuring not less than 2 inches by 3 inches.
5. Place grout as soon as possible after mortar has set to reduce shrinkage cracking of vertical joints.
6. Vertical Reinforcement:
 - a. First wire tie to foundation dowels, then build wall around it.
 - b. Provide reinforcing positioners or approved cross bracing to secure top of steel in place.
 - c. Do not drop in vertical steel after block is laid, unless reinforcing positioners are provided in the course above previously grouted course.

B. Grouting Requirements:

1. Slump: 8 inches to 11 inches.
2. Do not start grouting until wall has cured for 24 hours, minimum.
3. Partial Grouting Requirements:
 - a. Walls Not Requiring Solid Grouting: Fill cells containing reinforcing steel, anchor bolts, and other embedded items as shown with grout.
 - b. Construct cells to be filled to confine grout within cell.
 - c. Cover tops of unfilled vertical cells under a bond beam with metal lath to confine grout fill to bond beam section.
4. Form horizontal construction joints between pours by stopping grout pour 1-1/2 inches below a mortar joint, except at a bond beam; stop pour 1/2 inch below top of masonry unit.
5. Partial Grouting with Insulation Fill:
 - a. Where cells of masonry units are to receive masonry fill insulation in some cells and to receive grout in some cells, provide continuous mortar on block webs on each side of cells to be filled with grout to ensure insulation will not enter grout cells.
 - b. Where bond beams are required with masonry fill insulation and grout, limit pours to less than 6 feet in height.
6. Fully embed horizontal steel with grout in an uninterrupted pour.
7. Do not construct wall more than one course above top of grout pour prior to placing grout.

8. Vibration:
 - a. Use internal “pencil” type, low energy vibrator to thoroughly consolidate grout and reduce amount of air voids. Do not use concrete vibrators.
 - b. After waiting sufficient time to permit grout to become plastic, but before it has taken any set, reconsolidate grout.
 - c. Waiting period will vary depending upon weather conditions and block absorption rates, but under “normal” weather conditions with average masonry units the waiting period should be between 30 minutes to 60 minutes.
9. Cleanouts:
 - a. Provide for grout pours over 5 feet in height.
 - b. Provide of sufficient size to permit cleaning of cell, positioning of reinforcing, and inspection at bottom of every vertical cell containing reinforcing.
 - c. Location: Concealed from view after final construction, unless otherwise approved by Engineer.
 - d. After wall has been inspected and approved and prior to grouting, cap cleanouts in a manner that will seal them from grout leakage and provide a flush finish.

3.10 FIELD QUALITY CONTROL

- A. Inspection of masonry will be in accordance with IBC 2105.2.2.1.
- B. Masonry shall be tested by independent testing agency, retained by Contractor and approved by Engineer, in accordance with ASTM C1314, Method B, as modified by ACI 530.1/ASCE 6.
- C. Masonry test prisms, when required, shall be constructed onsite with same materials and workmanship to be used for Project.
- D. Provide adequate facilities for safe storage and proper curing of masonry prisms, mortar samples, and grout samples, as applicable, onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
- E. Masonry Testing:
 1. Unit Strength Method:
 - a. Method and frequency for mortar, grout, and masonry unit sampling and testing in accordance with IBC 2105.2.2.1. Sample and test units in accordance with ASTM C140.
 - b. Provide masonry units for test samples required.

F. Corrective Action:

1. If compressive strength tests made prior to construction of permanent structure fail to meet Specifications, adjustments shall be made to mix designs for mortar, or grout, or both, as needed to produce specified strength. Masonry units shall also be tested to verify compliance to requirements of ASTM C90.
2. If strength tests performed on materials representative of in-place construction fail to meet Specifications, prisms or cores shall be cut from constructed walls in sufficient locations to adequately determine strength in accordance with IBC 2105.3.

3.11 CLEANING

- A. Immediately after completion of grouting, clean masonry surfaces of excess mortar, grout spillage, scum, stains, dirt, and other foreign substances using clean water and fiber brushes.
- B. Clean walls not requiring painting or sealing so there are no visible stains.

3.12 PROTECTION OF INSTALLED WORK

- A. Do not allow grout and mortar stains to dry on face of exposed masonry.
- B. Protect tops of walls at all times. Cover tops of walls with waterproof paper when rain or snow is imminent and when the Work is discontinued.
- C. Adequately brace walls until walls and roof are completed.
- D. Provide sufficient bracing to protect walls against damage from elements, including wind and snow.
- E. Protect masonry against freezing for minimum 72 hours after being laid.
- F. Protect masonry from damage until final acceptance of the Work. Damaged units will not be accepted.

END OF SECTION

SECTION 05 05 19
POST-INSTALLED ANCHORS

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.
 - b. 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.
 - c. 355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
 2. American Iron and Steel Institute (AISI): Stainless Steel Type 316.
 3. American National Standards Institute (ANSI).
 4. ASTM International (ASTM):
 - a. A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A143, Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - c. A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - e. A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
 - f. A380, Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 - g. A385, Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - h. A563, Specification for Carbon and Alloy Steel Nuts.
 - i. A780, Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - j. A967, Specification for Chemical Passivation Treatments for Stainless Steel Parts.
 - k. E488, Standard Test Methods for Strength of Anchors in Concrete Elements.
 - l. F436, Specification for Hardened Steel Washers.
 - m. F468, Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.

- n. F568M, Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
 - o. F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - p. F594, Specification for Stainless Steel Nuts.
 - q. F1554, Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
5. International Association of Plumbing and Mechanical Officials Uniform ES (IAPMO-UES): Evaluation Reports for Concrete and Masonry Anchors.
6. International Code Council Evaluation Service (ICC-ES):
- a. Evaluation Reports for Concrete and Masonry Anchors.
 - b. AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.
 - c. AC70, Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements.
 - d. AC106, Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements.
 - e. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - f. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements. Evaluation Reports for Concrete and Masonry Anchors.
7. 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. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.
- B. Exterior Area: Location not protected from weather by a building or other enclosed structure to include buried roof structures.
- C. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or wash down, and where wall or roof slab is not common to a water-holding or earth-retaining structure.
- D. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or wash down, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.

- E. Submerged: Location at or below top of wall of open water-holding structure, such as a 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: Specific instructions for concrete anchor installation, including drilled hole size and depth, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

B. Informational Submittals:

- 1. Concrete and Masonry Anchors:
 - a. Manufacturer's product description and installation instructions.
 - b. Current ICC-ES or IAPMO-UES Report for each type of post-installed anchor to be used.
 - c. Adhesive Anchor Installer Certification.
- 2. Passivation method for stainless steel members.
- 3. 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. Installers of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Installer Certification Program or equivalent.
- 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. Package stainless steel items in a manner to provide protection from carbon impregnation.
- B. Protect hot-dip galvanized finishes from damage as a result of metal banding and rough handling.

PART 2 PRODUCTS

2.01 GENERAL

A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Stainless Steel:	
Threaded Rods	F593, AISI Type 316, Condition CW
Nuts*	F594, AISI Type 316, Condition CW
Carbon Steel:	
Threaded Rods	F1554, Grade 36 or F568M Class 5.8
Flat and Beveled Washers (Hardened)	F436
Nuts*	A194/A194M, Grade 2H
Galvanized Steel:	
All	A153/A153M
*Nuts of other grades and styles having specified proof load stresses greater than specified grade and style are also suitable. Nuts must have specified proof load stresses equal to or greater than minimum tensile strength of specified threaded rod.	

B. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, and zinc-plated steel material types as indicated in Fastener Schedule at end of this section.

2.02 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. Post-installed anchor systems used in concrete shall be approved by ICC Evaluation Services Report or equivalent for use in cracked concrete and for short-term and long-term loads including wind and earthquake.
3. Mechanical Anchors: Comply with the requirements of ICC-ES AC193 or ACI 355.2.
4. Adhesive Anchors: Comply with the requirements of ICC-ES AC308 or ACI 355.4.

B. Torque-Controlled Expansion Anchors (Wedge Anchors):

1. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; Kwik-Bolt –TZ (KB-TZ) Anchors (ESR-1917).
 - b. DeWalt/Powers Fasteners, Brewster, NY; Power-Stud +SD1 , +SD2, +SD4, or +SD6 Anchors (ESR-2502 and ESR-2818).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 Anchors (ESR-1771 and ESR-3037).

C. Undercut Anchors:

1. Manufacturers and Products:
 - a. USP Structural Connectors, Burnsville, MN; DUC Undercut Anchor (ESR-1970).
 - b. Hilti, Inc., Tulsa, OK; HDA Undercut Anchor (ESR-1546).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; TORQ-CUT Self-Undercutting Anchor (ESR-2705).
 - d. DeWalt/Powers Fasteners, Brewster, NY; Atomic+ Undercut Anchor (ESR-3067).

D. Adhesive Anchors:

1. Threaded Rod:
 - a. Diameter as shown on Drawings.
 - b. Length as required to provide minimum depth of embedment indicated and thread projection required.
 - c. Clean and free of grease, oil, or other deleterious material.
2. 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.
3. Packaging and Storage:
 - a. Disposable, self-contained system capable of dispensing both components in proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
 - b. Store adhesive on pallets or shelving in a covered storage area.
 - c. Package 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.

4. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT-RE 500-V3 (ESR-3814) Adhesive Anchors.
 - b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-3G Epoxy Adhesive Anchors (ESR-4057).
- E. Adhesive Threaded Inserts:
 1. Type 316 stainless steel, internally threaded inserts.
 2. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-RN Insert with HIT-RE 500-V3 or HIT-HY 200 adhesive.

2.03 POST-INSTALLED MASONRY ANCHORS

- A. General: AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Fastener Schedule at end of section.
- B. Current ICC Evaluation Report indicating acceptance for anchors at structural applications in masonry.
- C. Manufacturers and Products:
 1. Hilti, Inc., Tulsa, OK; Kwik-Bolt-3 (KB-3) (ESR-1385), for grout-filled masonry, HIT-HY 70 (ESR-2682) for grout filled CMU, hollow CMU, or unreinforced masonry.
 2. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 (IAPMO ER 240) for grout filled CMU, Titen-HD (ESR-1056) for grout filled or hollow CMU, AT-XP (IAPMO ER-281) for grout filled CMU.
 3. DeWalt/Powers Fasteners, Brewster NY; Power-Stud+ SD1 (ESR-2966) for grout-filled masonry, Wedgebolt+ (ESR-1678) for grout-filled masonry.

PART 3 EXECUTION

3.01 CONCRETE AND MASONRY ANCHORS

- A. Begin installation only after concrete or masonry to receive anchors has attained design strength.
- B. Locate existing reinforcing with Ground Penetrating Radar or other method approved by Engineer prior to drilling. Coordinate with Engineer to adjust anchor locations where installation would result in hitting reinforcing.
- C. Install in accordance with written manufacturer's instructions.
- D. Provide minimum embedment, edge distance, and spacing as indicated on Drawings.

- E. Use only drill type and bit type and diameter recommended by anchor manufacturer.
- F. Clean hole of debris and dust per manufacturer's requirements.
- G. When unidentified embedded steel, rebar, or other obstruction is encountered in drill path, slant drill to clear obstruction. If drill must be slanted more than indicated in manufacturer's installation instructions to clear obstruction, notify Engineer for direction on how to proceed.
- H. Adhesive Anchors:
 - 1. Unless otherwise approved by Engineer and adhesive manufacturer:
 - a. Do not install adhesive anchors when temperature of concrete or masonry is below 40 degrees F or above 100 degrees F.
 - b. Do not install prior to concrete attaining an age of 21 days.
 - c. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry.
 - d. Do not disturb anchor during recommended curing time.
 - e. Do not exceed maximum torque as specified in manufacturer's instructions.
 - 2. For hollow-unit masonry, install screen tube in accordance with manufacturer's instructions.
- I. Prestressed Concrete: Do not use drilled-in anchors in prestressed or post-tensioned concrete members without Engineer's prior approval unless specifically shown on Drawings.

3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

3.03 MANUFACTURER'S SERVICES

- A. Adhesive and Mechanical Anchors: Conduct Site training of installation personnel for proper installation, handling, and storage of adhesive anchor system. Notify Engineer of time and place for sessions.

3.04 FASTENER SCHEDULE

A. Unless indicated otherwise on Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Post-Installed Anchors for Metal Components to Cast-in-Place Concrete (such as, Ladders, Handrail Posts, Electrical Panels, Platforms, and Equipment)		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc-plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an overhead application
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an overhead application
2. Anchors in Grout-Filled Concrete Masonry Units		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc-plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	
3. Anchors in Hollow Concrete Masonry Units		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc-plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	Adhesive anchors shall be installed with screen tubes.

Service Use and Location	Product	Remarks
Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Adhesive anchors shall be installed with screen tubes.
4. All Others		
All service uses and locations	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on all 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 05 23
WELDING****PART 1 GENERAL****1.01 REFERENCES**

- A. The following is a list of standards that may be referenced in this section:
1. American Society of Mechanical Engineers (ASME):
 - a. BPVC SEC V, Nondestructive Examination.
 - b. BPVC SEC IX, Welding and Brazing Qualifications.
 2. American Society of Nondestructive Testing (ASNT): SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing.
 3. ASTM International (ASTM): A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
 4. American Welding Society (AWS):
 - a. A2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 - b. A3.0, Standard Welding Terms and Definitions.
 - c. D1.1/D1.1M, Structural Welding Code - Steel.
 - d. D1.8/D1.8M, Structural Welding Code - Seismic Supplement.
 - e. D1.2/D1.2M, Structural Welding Code - Aluminum.
 - f. D1.3/1.3M, Structural Welding Code - Sheet Steel.
 - g. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
 - h. QC1, Standard for AWS Certification of Welding Inspectors.

1.02 DEFINITIONS

- A. CJP: Complete Joint Penetration.
- B. CWI: Certified Welding Inspector.
1. Contractor's Welding Inspector: Contractor's CWI acts for, and on behalf of, the Contractor for all inspection and quality matters within the scope of the Contract Documents. Contractor is required to provide a welding inspector to oversee welding operations and be responsible for visual inspection and necessary correction of all deficiencies in materials and workmanship required to meet referenced welding codes. This type of Quality Control Inspection is not classified as Special Inspection.
 2. Verification Inspector: CWI who acts on behalf of the Owner. This type of independent inspection and testing is the prerogative of the Owner, who may perform this function, or waive independent verification inspection if it is not required by the building official and building code.

- C. MT: Magnetic Particle Testing.
- D. NDE: Nondestructive Examination.
- E. NDT: Nondestructive Testing.
- F. PJP: Partial Joint Penetration.
- G. PQR: Procedure Qualification Record.
- H. PT: Liquid Penetrant Testing.
- I. Special Inspection: Non-destructive examination exclusive of VT. Special inspection includes NDE such as MT, PT, UT, RT and Verification Inspection. Special Inspection personnel report to, and are retained by the Owner. See additional requirements in Section 01 45 33, Special Inspection, Observation, and Testing.
- J. RT: Radiographic Testing.
- K. UT: Ultrasonic Testing.
- L. VT: Visual Inspection/Testing.
- M. WPQ: Welder/Welding Operator Performance Qualification Record.
- N. WPS: Welding Procedure Specification.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Shop and field WPSs and PQRs.
 - b. NDT procedure specifications prepared in accordance with ASME BPVC SEC V.
 - c. Welding Data (Shop and Field): Submit welding data together with Shop Drawings as a complete package.
 - 1) Show on Shop Drawings, or on a weld map, complete information regarding base metal specification designation, location, type, size, and extent of welds with reference called out for WPS and NDE numbers in tails of combined welding and NDE symbols as indicated in AWS A2.4.
 - 2) Clearly distinguish between shop and field welds.

- 3) Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for welds.
- 4) Welding and NDE Symbols: In accordance with AWS A2.4.
- 5) Welding Terms and Definitions: In accordance with AWS A3.0.

B. Informational Submittals:

1. WPQs.
2. CWI credentials.
3. Testing agency personnel credentials.
4. CWI visual inspection (VT) reports.
5. Welding Documentation: Submit on forms in referenced welding codes.

1.04 QUALIFICATIONS

- A. WPSs: In accordance with AWS D1.1/D1.1M (Annex M Forms) for shop or field welding; or ASME BPVC SEC IX (Forms QW-482 and QW-483) for shop welding only.
- B. WPQs: In accordance with AWS D1.1/D1.1M (Annex M Forms); or ASME BPVC SEC IX (Form QW-484).
- C. CWI: Certified in accordance with AWS QC1, and having prior experience with specified welding codes. Alternate welding inspector qualifications require prior approval by Engineer.
- D. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT SNT-TC-1A.

1.05 SEQUENCING AND SCHEDULING

- A. Unless otherwise specified, Submittals required in this section shall be submitted and approved prior to commencement of welding operations.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Fabricator's CWI shall be present whenever shop welding is performed. CWI shall perform inspection at suitable intervals, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1/D1.1M or referenced welding code and as follows:
 - 1. Verifying conformance of specified job material and proper storage.
 - 2. Monitoring conformance with approved WPS.
 - 3. Monitoring conformance of WPQ.
 - 4. Inspecting weld joint fit-up and performing in-process inspection.
 - 5. Providing 100 percent visual inspection of welds.
 - 6. Coordinating with nondestructive testing personnel and reviewing NDE test results.
 - 7. Maintaining records and preparing reports documenting that results of CWI VT and subsequent NDE testing comply with the Work and referenced welding codes.

PART 3 EXECUTION

3.01 GENERAL

- A. Welding and Fabrication by Welding: Conform to governing welding codes referenced in attached Welding and Nondestructive Testing Table.

3.02 NONDESTRUCTIVE WELD TESTING REQUIREMENTS

- A. Quality Control Inspection:
 - 1. All Welds: 100 percent VT by Contractor's CWI.
 - 2. Acceptance Criteria:
 - a. Structural Pipe and Tubing: AWS D1.1/D1.1M, Paragraph 9.25.
 - b. All Other Structural Steel: AWS D1.1/D1.1M, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
- B. Nondestructive Testing Requirements:
 - 1. NDT frequency shall be as specified below, as required by referenced welding codes, or as specified in the attached table. In case there is a conflict, the higher frequency level of NDT shall apply.
 - a. Nontubular Connections:
 - 1) CJP Butt Joint Groove Welds: 10 percent random RT. Use UT for CJP butt joint groove welds that cannot be readily radiographed.

- 2) All Other CJP Groove Welds: 10 percent random UT.
 - 3) Fillet Welds and PJP Groove Welds: 10 percent random PT or MT.
- b. Tubular Connections:
- 1) CJP butt joint groove welds made from one side without backing: 100 percent RT or UT in accordance with AWS D1.1/D1.1M, Paragraph 9.26.2 requirements.
 - 2) CJP Butt Joint Groove Welds made without backing or back-gouging: 10 percent random RT. Use UT for CJP butt joint groove welds that cannot be readily radiographed.
 - 3) All Other CJP Groove Welds: 10 percent random UT.
 - 4) Fillet Welds and PJP Groove Welds: 10 percent random PT or MT.
2. NDT Procedures and Acceptance Criteria:
- a. Nontubular Connections:
- 1) RT: Perform in accordance with AWS D1.1/D1.1M, Clause 6, Part E. Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.12.1.
 - 2) UT: Perform in accordance with AWS D1.1/D1.1M, Clause 6, Part F. Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.13.1.
 - 3) PT and MT:
 - a) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.14.4 and Paragraph 6.14.5.
 - b) Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
- b. Tubular Connections:
- 1) RT: Comply with requirements for Nontubular Connections and additional requirements of AWS D1.1/D1.1M, Clause 9, Paragraph 9.28 and Paragraph 9.29.
 - 2) UT: Comply with requirements for Nontubular Connections and additional requirements of AWS D1.1/D1.1M, Clause 9, Paragraph 9.27.
 - 3) PT and MT:
 - a) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.14.4 and Paragraph 6.14.5.
 - b) Acceptance criteria per AWS D1.1/D1.1M, Paragraph 9.25.

3.03 FIELD QUALITY CONTROL

- A. CWI shall be present whenever field welding is performed. CWI shall perform inspection, at suitable intervals, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1/D1.1M or referenced welding code and as follows:
1. Verify conformance of specified job material and proper storage.
 2. Monitor conformance with approved WPS.
 3. Monitor conformance of WPQ.
 4. Inspect weld joint fit-up and perform in-process inspection.
 5. Provide 100 percent visual inspection of all welds in accordance with Subparagraph Quality Control Inspection.
 6. Supervise nondestructive testing personnel and evaluating test results.
 7. Maintain records and prepare report confirming results of inspection and testing comply with the Work.

3.04 WELD DEFECT REPAIR

- A. Repair and retest rejectable weld defects until sound weld metal has been deposited in accordance with appropriate welding codes.

3.05 SUPPLEMENTS

- A. The supplement listed below, following “End of Section,” is a part of this specification.
1. Welding and Nondestructive Testing Table.

END OF SECTION

Welding and Nondestructive Testing						
Specification Section	Governing Welding Codes or Standards	Submit WPS	Submit WPQ	Onsite CWI Req'd	Submit Written NDT Procedure Specifications	NDT Requirements
05 31 00 Steel Decking	AWS D1.1/D1.1M, Structural Welding Code - Steel or AWS D1.3/D1.3M, Structural Welding Code - Sheet Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 05 31 00
05 50 00 Metal Fabrications	AWS D1.1/D1.1M, Structural Welding Code-Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum or AWS D1.6/D1.6M, Structural Welding Code - Stainless Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 05 50 00
05 53 00 Metal Gratings	AWS D1.2/D1.2M, Structural Welding Code - Aluminum	No	No	No	No	100% VT; also see Section 05 53 00
33 05 01.01 Welded Steel Pipe and Fittings	ASME BPV Code, Section IX; and AWS D1.1/D1.1M, Structural Welding Code - Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 33 05 01.01
33 05 01.04 Bar-Wrapped Concrete Cylinder Pipe and Fittings	ASME BPV Code, Section IX; and AWS D1.3/D1.3M, Structural Welding Code - Sheet Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 33 05 01.04

**SECTION 05 31 00
STEEL DECKING****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): Specifications for the Design of Cold Formed Steel Structural Members.
 2. American Welding Society (AWS): D1.3, Structural Welding Code - Sheet Steel.
 3. ASTM International (ASTM):
 - a. A611, Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled.
 - b. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - d. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 4. Steel Deck Institute (SDI):
 - a. Design Manual for Composite Decks, Form Decks and Roof Decks.
 - b. Diaphragm Design Manual.
 5. Factory Mutual (FM):
 - a. Factory Mutual Approval Guide.
 - b. FM Research Corporation (FMRC): Approval Requirements for Steel Roof Deck Construction.
 6. International Code Council Evaluation Service, Inc. (ICC-ES): Evaluation Reports for Deck Fasteners.
 7. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory.

1.02 SUBMITTALS

- A. Action Submittals:
1. Plan view layout of decking showing type and section properties of deck panels, reinforcing channels, pans, special jointing, and accessories.
 2. Location of openings, deck laps, and deck attachment details.

B. Informational Submittals:

1. Decking manufacturer's installation requirements.
2. Welding Procedures, Qualifications, and Inspection Report: As specified in Section 05 05 23, Welding.
3. Operation manuals for mechanical fastener installation tools.
4. Manufacturer's Certificate of Compliance, in accordance with **Section 01 61 00, Common Product Requirements**.

1.03 QUALITY ASSURANCE

- A. General: For metal decking section properties, meet requirements of AISI Specifications for Design of Cold-Formed Steel Structural Members.
- B. FM Requirements:
 1. Steel Roof Deck: Listed in Factory Mutual "Approval Guide" for Class 1 fire rating and Class 1-90 wind uplift rating.
 2. Mechanical Fasteners: Packing containers shall show name of manufacturer and product and FMRC approval mark.
- C. Qualifications for Field Welding: As specified in Section 05 05 23, Welding.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store deck bundles on platforms or pallets, with one end elevated to provide drainage.
- C. Protect bundles against condensation with a ventilated waterproof covering.
- D. Stack bundles so there is no danger of tipping, sliding, rolling, shifting or material damage.

PART 2 PRODUCTS

2.01 METAL DECKING

- A. Provide metal deck as shown on Drawings.

B. Materials and Finishes:

1. Galvanized Deck:

- a. Sheet steel for galvanized deck and accessories shall conform to ASTM A653 Structural Quality Grade 33 or higher, as shown in Steel Deck Schedule.
- b. Galvanizing shall conform to ASTM A924 with coating class of G60 or G90 as defined in ASTM A653 and as shown in Steel Deck Schedule.

C. Manufacturers:

1. Vulcraft Division of Nucor Co., Brigham City, UT.
2. BHP Steel Building Products, USA, Inc., West Sacramento, CA.
3. Verco Manufacturing, Inc., Phoenix, AZ.
4. United Steel Deck, Inc., Summit, NJ.

2.02 ACCESSORIES

- A. Provide pour stops, column closures, end closures, cover plates, girder fillers, ridge and valley plates, finish strips, reinforcing channels, and other accessories as required for complete installation.
- B. Accessories shall be minimum 22-gauge, except edge forms shall be sized as required by the deck manufacturer, unless shown otherwise on the Drawings.

2.03 MECHANICAL FASTENERS

A. Self-Drilling Screws:

1. Self-drilling, self-tapping screws with hexagonal washer head and corrosion-resistant finish.
2. Manufacturers and Products:
 - a. ITW Buildex, Itasca, IL; ICH Traxx Self-Drilling Fasteners with Climaseal Coating and Autotraxx Standup Installation Tool.
 - b. Hilti, Inc., Tulsa, OK; Kwik-Pro HWH Self-Drilling Screws with Kwik-Cote Treatment and Kwik-Tapper Screwdriver.

B. Powder Driven Fasteners:

1. Knurled shank, minimum 1/2-inch diameter steel washer, corrosion-resistant coating.
2. Pin diameter and length to suit deck type and flange thickness of steel support member.

3. Manufacturers and Products:
 - a. ITW Buildex, Itasca, IL; Buildex BX14 pins with yellow dichromate galvanizing and BX900 Installation Tool.
 - b. Hilti, Inc., Tulsa, OK; ENP-series fasteners with electroplated zinc coating and DX-750 Installation Tool.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

3.02 INSTALLATION

- A. Locate deck bundles to prevent overloading of support framing members.
- B. Install at right angles to supporting members in a three span minimum lay-up, unless shown otherwise, and in accordance with Specification and manufacturer's installation recommendation.
- C. Bearing: 1-1/2 inches, minimum.
- D. Endlaps: Minimum of 2 inches and located over supports.
- E. Do not stretch sidelaps.
- F. Closure Plates:
 1. Install closure and cover plate accessories as recommended by the metal deck manufacturer, unless shown otherwise on the Drawings.
 2. Floor Deck and Form Deck Closures:
 - a. Fasten column closures, cell closures, and zee closures to deck to provide tight fitting closures at open ends of ribs and sides of decking.
 - b. Fasten cell closures at changes of direction of deck units unless otherwise indicated.
- G. Holes and Openings
 1. Cut and fit around roof openings and other work projecting through or adjacent to decking.
 2. Locate holes and openings as shown to clear structural framing and bracing members.

3. Reinforcement around openings:
 - a. Roof Deck: For hole sizes of at least 6 inches across, but not more than 12 inches across in roof deck, reinforce with 0.0474-inch design thickness steel plate, painted or galvanized to match deck coating. Extend plate at least 12 inches beyond opening in all directions and attach to top of roof deck with No. 10 self-drilling screws at 6-inch spacing and at all corners. For openings larger than 12 inches across, reinforce roof deck with framing as shown on Drawings.
 - b. Composite Floor Deck and Form Deck: Reinforce openings as indicated on Drawings.

- H. Protect deck areas from heavy concentrated loads or wheel traffic with planking or other approved means.

- I. Install temporary shoring, if required, to meet strength and deflection limitations, before placing any concrete topping on deck panels.

- J. Completed Deck: Free from buckles and irregularities, and in accordance with FM and UL requirements.

3.03 DECK ATTACHMENT

- A. Fasten panels as shown on Drawings.

- B. Welded Connections: Weld deck sidelaps, attachment to framing, and accessories in accordance with AWS D1.3 and as specified in Section 05 05 23, Welding.

- C. Mechanical Fasteners:
 1. Self-Drilling Screws:
 - a. Install screws in accordance with manufacturer's written instructions and with special installation tool. Do not over-torque.
 - b. Remove and re-drive screws at sidelaps where upper sheet is not drawn tightly against lower sheet.
 2. Powder Driven Fasteners:
 - a. Install fasteners in accordance with manufacturer's written instructions and with special installation tool.
 - b. Minimum Sidelap Edge Distance: 3/8 inch.
 - c. Minimum End/End Lap Distance: 1 inch.
 - d. Head Projection: As specified by manufacturer for correct penetration into flange of steel support member.

3.04 TOUCHUP PAINTING

- A. Immediately following erection, remove unused deck edge trimmings, screws, fasteners, welding washers, butt ends of welding rods, and debris from completed installation.
- B. Clean field welds, bolted connections, rust spots, and abraded areas.
- C. Repair damaged painted surfaces as specified in Section 09 90 00, Painting and Coating.
- D. Repair damaged galvanized surfaces with zinc-rich spray paint in accordance with ASTM A780; color to match galvanized deck.
- E. Use magnetic gauge to determine that thickness of repair is equal to or greater than base painted or galvanized coating.

3.05 FIELD QUALITY CONTROL

- A. An independent testing agency will be retained by Owner to perform following inspections.
 - 1. Welded Connections: Visually inspect in accordance with AWS D1.3, Section 7, and as specified in Section 05 05 23, Welding.
 - 2. Mechanical Fasteners: Visually inspect, in accordance with manufacturer's instructions, for each type of fastener.
- B. Repair or replace defective welds and fasteners.
- C. Special inspection will be provided by Owner where indicated on Drawings.

END OF SECTION

SECTION 05 41 00
STRUCTURAL METAL STUD FRAMING

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):
 - a. Specification for the Design of Cold-Formed Steel Structural Members.
 - b. Cold-Formed Steel Design Manual.
 - c. Design Guide for Cold-Formed Steel Trusses.
 - d. Fasteners for Residential Steel Framing.
 2. American Welding Society, Inc. (AWS):
 - a. C1.1, Recommended Practices for Resistance Welding.
 - b. C1.3, Recommended Practices for Resistance Welding Coated Low Carbon Steels.
 - c. D1.3, Structural Welding Code-Sheet Steel.
 3. ASTM International (ASTM):
 - a. A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
 - b. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Structural Tubing in Rounds and Shapes.
 - c. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - d. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - e. C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - f. C955, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
 4. Center for Cold-Formed Steel Structures (CCFSS): Technical Bulletin, Vol. 2, No. 1, February 1993, Screw Connections.
 5. International Code Council (ICC): Evaluation Reports for Cold-Formed Steel Framing and Fasteners.

1.02 SUBMITTALS

A. Action Submittals:

1. Plan and elevation views of all metal framing systems, including location and framing of all openings.
2. Material specifications, member sizes, and properties.
3. Details of track, web stiffeners, stud bracing, blocking, bridging, and other members as required to provide a complete installation.
4. Details of connections including welding, mechanical fasteners, and accessory items.
5. Light-Gauge Steel Trusses: Complete design calculations for member stresses, deflections, and connections, stamped by a registered professional engineer, valid in same state as Project. Include calculations for anchorage connections to resist wind uplift and lateral loads and for temporary handling and bracing requirements.
6. Installation and erection instructions, including sequence of operations and requirements for temporary bracing and bridging.

B. Informational Submittals:

1. Manufacturer's installation requirements.
2. Welding Procedures, Qualifications, and Inspection Report: As specified in Section 05 05 23, Welding.
3. Operation manuals for mechanical fastener installation tools.

1.03 QUALITY ASSURANCE

- A. General: For member section properties, meet requirements of AISI, Specification for the Design of Cold-Formed Steel Structural Members.
- B. Qualifications for Welding: As specified in Section 05 05 23, Welding.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to Site in bundles marked with name of manufacturer, section type, thickness, grade of material, and length.
- B. Store bundles on wood blocking, flat and off ground, to keep clean and to prevent any damage or permanent distortion.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide size and type of members as indicated on Drawings.
- B. Sheet Steel: ASTM A653/A653M, with G-60 galvanized coating.
- C. Cold-Formed Members and Accessories: ASTM C955.
- D. Dimensions and Properties: Calculate section properties in accordance with AISI Cold-Formed Steel Design Manual.

2.02 STUDS AND JOISTS

- A. Material:
 - 1. ASTM A653/A653M, Structural Steel (SS) Grade 33, or High-Strength Low-Alloy Steel (HSLAS), Type A or B, Grade 50.
 - 2. Section: Type, size, and thickness as indicated on Drawings.
 - 3. Flanges: Stiffened with return lip.
 - 4. Webs:
 - a. Studs: Punched.
 - b. Joists: Unpunched, unless indicated otherwise on Drawings.
- B. Accessories:
 - 1. Track: Size as required to fit over studs, same thickness as stud material, unpunched.
 - 2. Blocking, Bridging, and Fire Stops: Same depth as studs or joists, 0.0566-inch minimum design thickness, unpunched.
 - 3. Bracing Straps, Angle Bracing, Clip Angles: Size and thickness as indicated on Drawings.
 - 4. Mounting Plates: 0.0566-inch minimum design thickness by 8 inches by 18 inches.
 - 5. Accessories shall be from same manufacturer as studs and joists.
- C. Manufacturers and Products:
 - 1. AMS, Los Angeles, CA; Angeles Metal Systems.
 - 2. Clark Steel, Middleton, OH; Steel Framing Systems.
 - 3. Dale Industries; Dearborn, MI; Dale/Incor Steel Framing.
 - 4. Dietrich Industries, Pittsburgh, PA; Lightgauge Metal Framing Products.
 - 5. Knorr Steel Framing Systems, Salem, OR; Light Gauge Steel Framing.

6. Marino/Ware, South Plainfield, NJ; Stud-Rite Lightweight Steel Framing Systems.
7. Unimast Incorporated, Schiller Park, IL; Steel Framing Systems.

2.03 LIGHT-GAUGE STEEL TRUSSES

- A. General: Provide type, chord configuration, span, and depth of trusses as indicated on Drawings.
- B. Material:
 1. Chord and Web Members:
 - a. ASTM A653/A653M, Structural Steel (SS) Grade 33, High-Strength Low-Alloy Steel (HSLAS), Type A or B, Grade 50, or A500, Grade B, with G60 galvanized coating and minimum design thickness equal to 0.0346 inch.
 - b. Section: Cold-formed rectangular tubing or C-sections with return lips and unpunched webs.
 2. Accessories: Provide manufacturer's standard bracing, bridging, blocking, reinforcements, tie straps, holddowns, fasteners, and accessories as required for a complete light gauge steel truss system.
- C. Design:
 1. Load Criteria: Dead, live, wind, and seismic, as shown on Drawings.
 2. Deflection Criteria:
 - a. Roof Live Load: 1/360 of span.
 - b. Floor Live Load: 1/480 of span.
 3. Design Standards:
 - a. AISI, Specification for Design of Cold-Formed Steel Structural Members.
 - b. AISI, Design Guide for Cold-Formed Steel Trusses.
 - c. CCFSS, Technical Bulletin for screw connections.
 - d. AWS C1.1, C1.3, and D1.3 for welded connections.
- D. Manufacturers and Products:
 1. Alpine Engineered Products, Inc., Pompano Beach, FL; TrusSteel.
 2. MiTek Industries, Inc., St. Louis, MO; Ultra-Span.

2.04 MECHANICAL FASTENERS

- A. Self-Drilling Screws:
 1. Self-drilling, self-tapping screws with hexagonal washer head and corrosion-resistant finish.

2. Manufacturers and Products:
 - a. ITW Buildex, Itasca, IL; ICH Traxx Self-Drilling Fasteners with Climaseal Coating and Autotraxx Standup Installation Tool.
 - b. Hilti, Inc., Tulsa, OK; Kwik-Pro HWH Self-Drilling Screws with Kwik-Cote Treatment and Kwik-Tapper Screwdriver.
- B. Powder-Driven Fasteners:
 1. Knurled shank, minimum 1/2-inch diameter steel washer, corrosion-resistant coating.
 2. Pin diameter and length to suit deck type and flange thickness of steel support member.
 3. Manufacturers and Products:
 - a. ITW Buildex, Itasca, IL; Buildex BX14 pins with yellow dichromate galvanizing and BX900 Installation Tool.
 - b. Hilti, Inc., Tulsa, OK; ENP-series fasteners with electroplated zinc coating and DX-750 Installation Tool.

2.05 CONCRETE ANCHORS

- A. Drilled anchors, size and type as shown on Drawings and as specified in Section 05 05 19, Post-Installed Anchors.

2.06 PREFABRICATION

- A. Structural wall framing panels may be prefabricated prior to erection.
- B. Light-gauge steel trusses shall be shop prefabricated.
- C. Prefabricated assemblies shall be not more than 1/8 inch out of square within length of assembly and shall be braced against racking. Use jig templates for layout and fabrication.
- D. Protect prefabricated panels from damage during handling.

2.07 SOURCE QUALITY CONTROL

- A. Special inspection of fabrication process and shop welding for light-gauge steel trusses will be provided by Owner as indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect all prefabricated assemblies and repair any damage.
- B. Examine bearing support surfaces for compliance with requirements for installation tolerances and other conditions affecting performance of metal framing systems.
- C. Provide smooth level bearing surfaces for bottom track of load-bearing walls.
- D. Clean all member and bearing surfaces that will be in contact after assembly.

3.02 INSTALLATION

A. General:

- 1. Install framing systems as indicated on Drawings, complete and in accordance with manufacturer's recommendations.
- 2. Provide temporary bracing for support of all construction loads until framing system is installed complete with sheathing or decking.
- 3. Install framing in true line, plumb, level, and in proper alignment.
- 4. Cut ends of framing members with saw or shear to bear uniformly against abutting members. Flame cutting is not permitted.
- 5. All structural framing members shall be full-length without splices, unless indicated otherwise.
- 6. Fasten members together in accordance with AISI, Cold-Formed Steel Design Manual, Part IV, Connections. Wire tying is not permitted.

B. Joists:

- 1. Position joists directly over bearing studs and attach to track.
- 2. Joists shall be one-piece within a single span. For multiple spans, lap joists and splice as shown on Drawings.
- 3. Immediately install bridging and solid blocking to support joists. Maximum spacing of bridging shall be 5 feet.
- 4. Install web stiffeners where indicated
- 5. Web Penetrations:
 - a. Drilled holes for other trades shall be limited to the middle 1/3 of the joist depth within the middle 1/3 of the span, unless indicated otherwise. Minimum spacing between drilled holes shall be 1-1/2 times the joist depth. Notching of joist flanges and flame cutting of holes are not permitted.

6. Tolerances:
 - a. Joist Spacing: Plus or minus 1/8 inch.
 - b. Joist Levelness: Plus or minus 1/8 inch in 10 feet.

C. Light-Gauge Steel Trusses:

1. Follow truss fabricator's instructions for proper handling, installation, and bracing of prefabricated trusses.
2. Provide proper lifting equipment adequate for size of trusses. Use designated lift points to avoid bending truss in weak direction.
3. Position trusses directly over bearing studs and attach to bearing track with holddown anchors.
4. Immediately install temporary bracing as required at top and bottom chords to keep trusses plumb and true to line.
5. Use temporary diagonal bracing to support top chords as required.
6. Install solid blocking at bearing tracks and ridge and attach permanent bridging.
7. Do not apply load to trusses until all bracing and bridging have been installed complete.
8. Do not remove, cut, or otherwise alter truss members or connections.
9. Tolerances:
 - a. Truss Length: Plus or minus 1/2 inch up to 30 feet in length, plus or minus 3/4 inch over 30 feet.
 - b. Truss Height: Plus or minus 1/4 inch up to 5 feet in height, plus or minus 1/2 inch over 5 feet.
 - c. Truss Spacing: Plus or minus 1/8 inch.
 - d. Truss Levelness: Plus or minus 1/8 inch in 10 feet.

3.03 FASTENERS

A. Self-Drilling Screws:

1. Install in accordance with manufacturer's written instructions and with special installation tool.
2. Screw type, diameter, and length shall be in accordance with AISI, Fasteners for Residential Steel Framing, minimum two screws per connection unless indicated otherwise.
3. Use clamp to hold members together. Drive screw from lighter to heavier gauge, to allow plies to be pulled together without stripping metal. Do not over torque. A minimum of three exposed threads shall extend through steel.
4. Minimum screw spacing, end distance, and edge distance shall be 3 diameters.

- B. Powder-Driven Fasteners:
 - 1. Use only for connecting cold-formed steel to structural steel members, unless indicated otherwise.
 - 2. Install in accordance with manufacturer's written instructions and with special installation tool.
- C. Welded Connections:
 - 1. Welding shall not be used for material thinner than 0.0451 inch.
 - 2. Weld framing members and accessories in accordance with AWS D1.3.
 - 3. Resistance welding for prefabricated framing shall be in accordance with AWS C1.1 and AWS C1.3.
 - 4. Repair galvanized surfaces damaged by welding with zinc-rich spray paint in accordance with ASTM A780.
- D. Concrete Anchors: Install in accordance with Section 05 05 19, Post-Installed Anchors.

3.04 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.
- C. An independent testing agency will be retained by Owner to perform following inspections.
 - 1. Welded Connections: Visually inspect in accordance with AWS D1.3, Section 7, and as specified in Section 05 05 23, Welding.
 - 2. Mechanical Fasteners: Visually inspect, in accordance with manufacturer's instructions, for each type of fastener.
- D. Repair or replace defective welds and fasteners.

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. A1085, Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B308/B308M, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ee. B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

- ff. B632/B632M, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
 - gg. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - hh. D1056, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 - ii. F436, Standard Specification for Hardened Steel Washers.
 - jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 - kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - ll. F594, Standard Specification for Stainless Steel Nuts.
 - mm. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
 - nn. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
9. 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.
10. 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. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals. Corrosive area includes areas exposed to corrosive atmosphere such as hydrogen sulfide from wastewater.
- C. Exterior Area: Location not protected from weather by building or other enclosed structure.
- D. 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.
- E. 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.

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- F. 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: Metal fabrications, including welding and fastener information.

B. Informational Submittals:

- 1. Pre-engineered Ladders: Letter of certification that ladder meets OSHA 29 CFR 1910.27 requirements.
- 2. Passivation method for stainless steel members.
- 3. Galvanized coating applicator qualifications.
- 4. 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. 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. Package assemblies, which have to be shipped unassembled to protect materials from damage and tag to facilitate identification and field assembly.
- B. Package stainless steel items 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.

1.06 SPECIAL GUARANTEE

- A. Manufacturer’s extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of sidewalk doors and floor hatches found defective during a period of 5 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.

1.07 EXTRA MATERIALS

- A. Furnish, tag, and box for shipment and storage the following extra materials:

Item	Quantity
Neoprene Gasket	Two for each location requiring neoprene gaskets.
4 inches wide by 50 feet long Neoprene Gasket Material	One roll for each location requiring neoprene gaskets.
Neoprene Gasket Adhesive	One (manufacturer’s recommended) for each location requiring neoprene gaskets.

- B. Delivery: In accordance with Section 01 61 00, Common Product Requirements.

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
Steel Wide Flange Shapes	A992/992M
Other Steel Shapes and Plates	A36/A36M or A572/A572M, Grade 50 or A992/A992M for other steel shapes
Steel Pipe	A500, Grade B
Hollow Structural Sections (HSS)	A500/A500M, Grade C
Aluminum:	
Aluminum Plates	B209, Alloy 6061-T6
Aluminum Structural Shapes	B308/B308M, Alloy 6061-T6
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, Group 2, Condition SH
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
Thrust Ties for Steel Pipe:	
Threaded Rods	A193/A193M, Grade B7
Nuts	A194/A194M, Grade 2H
Plate	A283/A283M, Grade D

Item	ASTM Reference
Welded Anchor Studs	A108, Grades C-1010 through C-1020
Aluminum Bolts and Nuts	F468, Alloy 2024-T4
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.
2. Fabricated Steel: ASTM A36/A36M.

2.03 POST-INSTALLED CONCRETE AND MASONRY ANCHORS

- A. See Section 05 05 19, Post-Installed Anchors.

2.04 PIPE SLEEVES

- A. As specified in Section 40 27 01, Process Piping Specialties.

2.05 STEEL LINTELS AND SHELF ANGLES

- A. ASTM A36/A36M, hot-dip galvanize after fabrication 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.

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2.07 FLOOR PLATE

A. Material:

1. Galvanized Steel: Carbon steel, ASTM A786/A786M, commercial grade, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
2. Stainless Steel: ASTM A793, AISI Type 304.
3. Aluminum: ASTM B632/B632M, Alloy 6061-T6.

B. Minimum Thickness:

1. Steel: 1/4 inch, unless shown otherwise on Drawings.
2. Aluminum: 3/8 inch, unless shown otherwise on Drawings.

C. Surface: Raised-lug pattern or diamond tread, unless shown otherwise on Drawings.

D. Slip-Resistant Surface:

1. Provide where indicated on Drawings.
2. Manufacturers and Products:
 - a. IKG/Borden, Clark, NJ; MEBAC 2.
 - b. W.S. Molnar Co., Detroit, MI; SLIPNOT Grade 2–Medium.

2.08 EXTRUDED FLOOR PLATE

A. Extruded Deck Plate:

1. Minimum Section Height: As shown on Drawings.
2. Minimum Section Width: 12 inches.
3. Accessories: Dovetail interlock strips.
4. Manufacturer and Product: Alcoa Building Products, Inc., Sidney, OH; Standard Diamondback.

B. Extruded Tread Plate:

1. Minimum Section Height: 0.360 inch, plus serrations.
2. Section Width: 12 inches.
3. Accessories: Edgebands, tongue-and-groove attachment.
4. Manufacturer and Product: Alcoa Building Products, Inc., Sidney, OH; Standard Diamondback.

2.09 SIDEWALK DOORS

- A. Load Capacity: 300 psf with maximum deflection of 1/150th of span. Provide H-20 wheel loading capacity where indicated on Drawings.
- B. Component Fabrication:
1. Access Door Leaf(s): 1/4-inch aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.
 2. Channel Frame: 1/4-inch-thick extruded aluminum trough frame with continuous anchor flange around perimeter. Weld 1-1/2-inch diameter drain coupling, and drain pipe, to frame trough at front right corner, unless indicated otherwise on Drawings.
- C. Door Hardware:
1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts.
 2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
 3. Hold-Open Arm:
 - a. Locks automatically in open position.
 - b. Disengages with slight pull on vinyl grip with one hand.
 - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
 4. Snap Lock:
 - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
 - b. Threaded plug for flush outside surface with key wrench removed.
- D. Aluminum: Mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.
- E. Manufacturers and Products:
1. Bilco Co., New Haven, CT; J Series.
 2. Nystrom Products Co., Minneapolis, MN; FG Series.
 3. U.S.F. Fabrication, Hialeah, FL; T Series.
 4. ITT Flygt Corporation, Trumbull, CT; FDRN Series.
 5. Thompson Fabricating Co., Birmingham, AL; TE Series.
 6. Halliday Products, Orlando, FL; WS Series.

2.10 FLOOR HATCHES

- A. Load Capacity: 300 psf with maximum deflection of 1/150th of span.
- B. Component Fabrication:
 - 1. Access Door Leaf(s): 1/4-inch-thick aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.
 - 2. Angle Frame: 1/4-inch thick extruded aluminum angle frame with concrete anchors and integral neoprene gasket strip.
- C. Door Hardware:
 - 1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins, through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts.
 - 2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
 - 3. Hold-Open Arm:
 - a. Locks automatically in open position.
 - b. Disengages with slight pull on vinyl grip with one hand.
 - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
 - 4. Snap Lock:
 - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
 - b. Threaded plug for flush outside surface with key wrench removed.
- D. Aluminum: Mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.
- E. Manufacturers and Products:
 - 1. Bilco Co., New Haven, CT; K Series.
 - 2. Nystrom Products Co., Minneapolis, MN; FH Series.
 - 3. U.S.F. Fabrication, Hialeah, FL; A Series.
 - 4. ITT Flygt Corporation, Trumbull, CT; FLE Series.
 - 5. Thompson Fabricating Co., Birmingham, AL; TI Series.
 - 6. Halliday Products, Orlando, FL; SS Series.

2.11 FABRICATED UNITS

- A. Weir and Baffle Plates: Fabricate plates and associated framing of stainless steel, AISI Type 316, unless indicated otherwise on Drawings.

2.12 ACCESSORIES

A. Antiseizing Lubricant for Stainless Steel Threaded Connections:

1. Resists washout.
2. Manufacturers and Products:
 - a. Bostik, Middleton, MA; Neverseez.
 - b. Saf-T-Eze Div., STL Corp., Lombard, IL; Anti-Seize.

B. Neoprene Gasket:

1. ASTM D1056, 2C1, soft, closed-cell neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown on Drawings.
2. Thickness: Minimum 1/4 inch.
3. Furnish without skin coat.
4. Manufacturer and Product: Monmouth Rubber and Plastics Corporation, Long Branch, NJ; Durafoam DK1111LD.

2.13 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 percent and 0.25 percent.
3. Fabricate aluminum in accordance with AA Specifications for Aluminum Structures—Allowable Stress Design.

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. 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. Watertight Seal: Where required or shown, furnish neoprene gasket of a type that is satisfactory for use in contact with sewage. Cover full bearing surfaces.
- H. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.
- I. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

2.14 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 will be retained by Owner 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 or masonry.
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.

D. Steel Lintels and Shelf Angles: Provide as required for support of masonry and other construction not attached to structural steel framing, unless otherwise shown on Drawings.

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 ACCESS COVERS

- A. Install access covers, including sidewalk doors, floor hatches, and hinged manhole covers in accordance with manufacturer's instructions.
- B. Accurately position prior to placing concrete, such that covers are flush with floor surface.
- C. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.
- D. Route drain pipe to exterior face of concrete or as shown on Drawings.
- E. Position cover so that hinge is on side opposite ladder.

3.04 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, masonry, 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.

3.05 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.

C. Field Painting of Shop Primed Surfaces: Prepare surfaces and field finish in accordance with Section 09 90 00, Painting and Coating.

3.06 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

A. Owner-Furnished Quality Assurance:

1. In accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing.
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. Manufacturer’s Certificate of Compliance per Section 01 61 00, Common Product Requirements, for test results, or calculations, or drawings that ensure material and equipment design and design criteria meet requirements of Section 01 61 00, Common Product Requirements and Section 01 88 15, Anchorage and Bracing.

3.07 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	Hot-dip galvanized 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	Hot-dip galvanized steel headed anchor bolts, unless otherwise specified with equipment	

Service Use and Location	Product	Remarks
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. Post-Installed Anchors: See Section 05 05 19, Post-Installed Anchors		
4. Anchors Cast in Grout-Filled Concrete Masonry Units		
Dry Areas	Hot-dip galvanized steel headed anchor bolts or zinc-plated steel sleeve anchors	
Exterior and Interior Wet Areas	Hot-dip galvanized steel headed anchor bolts, zinc-plated or stainless steel sleeve anchors	
5. 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.
6. Connections of Aluminum Components		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections, unless otherwise specified with equipment	
7. All Others		
Exterior and Interior Wet and Dry Areas	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on stainless steel threads.

END OF SECTION

**SECTION 05 52 16
ALUMINUM RAILINGS**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. Aluminum Association, Incorporated (AA): DAF45, Designation System for Aluminum Finishes.
 2. American Concrete Institute (ACI) 318, Building Code Requirements for Structural Concrete.
 3. American Iron and Steel Institute (AISI).
 4. ASTM International (ASTM):
 - a. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - b. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - c. E894, Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 - d. E935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
 - e. E985, Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
 5. International Code Council (ICC): International Building Code (IBC).
 6. 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 includes 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 DESIGN REQUIREMENTS

- A. Structural Performance of Railing Systems: Design, test, fabricate, and install railings to withstand the following structural loads without exceeding allowable design working stress or allowable deflection. Apply each load to produce maximum stress and deflection in railing system components.
 - 1. Railing System: Capable of withstanding the following load cases applied:
 - a. Concentrated load of 200 pounds applied at any point and in any direction in accordance with ICC IBC and OSHA.
 - b. Uniform load of 50 pounds per linear foot applied in any direction in accordance with ICC IBC.
 - c. Concentrated load need not be assumed to act concurrently with uniform loads in accordance with ICC IBC.
 - 2. In-Fill Area of Railing Systems:
 - a. Capable of withstanding a horizontally applied normal load of 50 pounds applied to 1 square foot at any point in system including panels, intermediate rails, balusters, and openings and space between railings.
 - b. Horizontal concentrated load need not be assumed to act concurrently with loads on top rails of railings.
 - 3. Calculated lateral deflection at top of posts shall not exceed 1 inch.

1.04 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: Calculations or test data using specified design performance loads and including the following:
 - 1) Bending stress in, and deflection of, posts in accordance with ASTM E985 as modified herein.
 - 2) Design of post base connection.

- 3) Documentation that concrete anchors have been designed in accordance with one of the following:
 - a) ACI 318, Appendix D.
 - b) ICC Evaluation Services Report for selected anchor.
2. Samples:
 - a. Rail sections, 6 inches long showing each type of proposed connection, proposed finish, and workmanship.
 - b. Each fitting including wall brackets, castings, toeboard, and rail expansion joints.
- B. Informational Submittals:
 1. Manufacturer's assembly and installation instructions.
 2. Special Inspection: Manufacturer's instructions for Special Inspection of post-installed anchors.
 3. Test Reports: Test data may supplement load calculations providing data covers complete railing system, including anchorage:
 - a. Test data for railing and components showing load and deflection as a result of load, in enough detail to prove railing is strong enough and satisfies national, state, local standards, regulations, code requirements, and OSHA 29 CFR 1910, using design loads specified. Include test data for the following:
 - 1) Railing and post connections.
 - 2) Railing wall connections.
 - 3) Railing expansion joint connections.
 - 4) Railing system gate assembly, including latch, gate stop, and hinges. Both gate latch and stop to support required loads applied independent of each other.
 - b. Testing of anchorages shall be in accordance with ASTM E894 and ASTM E935 using applied loads in accordance with ICC IBC.
 - c. Deflection Criteria: In accordance with ASTM E985 and design loads specified, except as follows: maximum calculated lateral deflection at top of posts shall not exceed 1 inch.
 - d. Aluminum Rail Piping: Test data showing yield strength of pipe as delivered equals or exceeds specified values.
 4. Manufacturer's written recommendations describing procedures for maintaining railings including cleaning materials, application methods, and precautions to be taken in use of cleaning materials.

1.05 QUALITY ASSURANCE

- A. Qualifications: Calculations required for design data shall be stamped by a registered civil or structural engineer licensed in state where Project will be constructed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package and wrap railings to prevent scratching and denting during shipment, storage, and installation. Maintain protective wrapping to the extent possible until railing is completely installed.
- B. Delivery:
 - 1. Shop assemble into practical modules of lengths not exceeding 24 feet for shipment.
 - 2. Deliver toeboards loose for field assembly.
 - 3. Deliver clear anodized railing pipe and posts with protective plastic wrap.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Thermal Movements: Allow for thermal movement resulting from the following maximum range in ambient temperature in design, fabrication, and installation of railings to prevent buckling, opening up of joints, over stressing of components, connections and other detrimental effects. Base design calculation on actual surface temperature of material as a result of both solar heat gain and night time sky heat loss. Temperature change is difference between high or low temperature and installation temperature.
 - 1. Temperature Change Range: 70 degrees F, ambient; 100 degrees F, material surfaces.

PART 2 PRODUCTS

2.01 ALUMINUM RAILINGS

- A. General:
 - 1. Furnish pre-engineered and prefabricated railing systems as shown on Drawings.
 - 2. Railing systems using pop rivets or glued railing construction are not permitted.
 - 3. Sand cast accessories and components are not permitted.
 - 4. Fasteners shall be AISI Type 316 stainless steel, unless otherwise noted.
- B. Rails, Posts, and Formed Elbows:
 - 1. Extruded Alloy 6105-T5, 6061-T6, or equivalent.
 - 2. Tensile Strength: 38,000 psi, minimum.

3. Yield Strength: 35,000 psi, minimum.
4. Wall Thickness: 0.145 inch, minimum.
5. Posts and railings shall be nominal 1-1/2-inch diameter (1.90-inch outside diameter).

C. Accessories:

1. Fittings and Accessories:
 - a. Extruded, machined bar stock, permanent mold castings, or die castings of sufficient strength to meet load requirements.
 - b. Gauge metal components are not acceptable for load-resisting components.
 - c. Fittings shall match color of pipe in railings.
2. Miscellaneous Extruded Aluminum Parts: Alloys 6063-T6, 6061-T6, or 6105 T5 aluminum, or equivalent, and of adequate strength for all loads.
3. Castings for Railings:
 - a. Cast Al-mag with sufficient strength to meet load and test requirements.
 - b. Anodizable grade finish with excellent resistance to corrosion when subjected to exposure of sodium chloride solution intermittent spray and immersion.
4. Post Anchorages:
 - a. Refer to standard details for types of post anchorages and minimum requirements.
 - b. Bolts at anchorages shall be minimum 1/2-inch diameter.
5. Wall Brackets: Adjustable wall fitting, with provision for minimum three 3/8-inch diameter AISI Type 316 stainless steel bolts or concrete anchors.
6. Rail Terminals (including Wall Returns): Aluminum wall fitting with provision for three 3/8-inch Type 304 fasteners.
7. Railing System Gate:
 - a. Extruded aluminum rail components.
 - b. Hardware Manufacturers and Products:
 - 1) Julius Blum & Co., Inc., Carlstadt, NJ; No. 782/3 gate hinges with springs, and No. 784 gate latch and stop.
 - 2) CraneVeyor Corp., South El Monte, CA; No. C4370b gate hinges with spring, No. C4369 gate latch, and No. C4368 gate stop.
 - 3) Moultrie Manufacturing Co., Moultrie, GA; Part No. W60006.
8. Toeboards:
 - a. Molded or extruded Alloy 6063-T6 or 6061-T6 aluminum.
 - b. Provide slotted holes for expansion and contraction where required.
9. Fasteners: Stainless steel.

D. Metal Supports Embedded in Concrete: In accordance with Section 05 50 00, Metal Fabrications.

E. Finishes:

1. Pipe and Post: In accordance with AA DAF45, designation AA-M32-C22-A41.
2. Cast Fittings and Toeboards: In accordance with AA DAF45, designation AA-M10-C22-A41.

2.02 ANCHOR BOLTS, FASTENERS, AND CONCRETE ANCHORS

A. Locknuts, Washers, and Screws:

1. Elastic Locknuts, Steel Flat Washers, Round Head Machine Screws (RHMS): AISI Type 304 or Type 316 stainless steel.
2. Flat Washers: Molded nylon.

B. Bolts and Nuts for Bolting Railing to Metal Beams: ASTM A193/A193M and ASTM A194/A194M, Type 316 stainless steel.

C. Concrete Anchors:

1. Stainless steel, AISI Type 316.
2. Post-installed anchors in accordance with Section 05 50 00, Metal Fabrications, unless otherwise specified herein.
3. Bolt Diameter: 1/2-inch, minimum.

2.03 FABRICATION

A. Shop Assembly:

1. Post Spacing: Maximum 6-foot horizontal spacing.
2. Railing Posts Bolted to Metal or Concrete:
 - a. In lieu of field cutting, provide approved fitting with sufficient post overlap, containing provisions for vertical adjustment.
 - b. Field fit-up is required.
3. Free of burrs, nicks, and sharp edges when fabrication is complete.
4. Welding is not permitted.

B. Shop/Factory Finishing:

1. Use same alloy for uniform appearance throughout fabrication for railings.
2. Railing and Post Fittings: Match fittings with color of pipe in railing.

- C. Shop Assembly:
 - 1. Shop assemble rails, posts, and formed elbows with a close tolerance for tight fit.
 - 2. Fit dowels tightly inside posts.
- D. Repair of Defective Work: Remove stains and replace defective Work.

PART 3 EXECUTION

3.01 GENERAL

- A. Field fabrication of aluminum railing systems is not permitted.
- B. Where required, provide railing posts longer than needed and field cut to exact dimensions required in order to satisfy vertical variations on actual structure.
- C. 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.
- D. Modification to supporting structure is not permitted where railing is to be attached.
- E. Mount railings only on completed walls. Do not support railings temporarily by means not satisfying structural performance requirements.
- F. 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. Assembly and Installation: Perform in accordance with manufacturer's written recommendations for installation.
- B. Expansion Joints:
 - 1. Maximum intervals of 54 feet on center and at structural 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 expansion joints in structural walls and floors supporting the posts.

C. Posts and Rails:

1. Surface Mounted Posts:
 - a. Bolt post baseplate connectors firmly in place.
 - b. Shims, wedges, grout, and similar devices for railing post alignment not permitted.
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.

D. Wall Brackets: Support wall rails on brackets spaced maximum 5 feet on centers as measured on the horizontal projection.

E. Toeboard:

1. Provide at railings, except where 4-inch or higher concrete curbs are installed, at gates, or at 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.

F. Railing System Gate: Install in accordance with manufacturer's installation instructions.

3.03 FIELD FINISHING

- A. Corrosion Protection: Prevent galvanic action and other forms of corrosion caused from direct contact with concrete and dissimilar metals by coating metal surfaces as specified in Section 09 90 00, Painting and Coating.

3.04 FIELD QUALITY CONTROL

- A. Post-installed anchors supporting railing systems require special inspection.
- B. Owner-Furnished Quality Assurance, in accordance with ICC 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.
- C. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

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.
- C. If stain remains after washing, restore in accordance with railing manufacturer's recommendations or replace stained railings.

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. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - c. 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.
 - d. 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.
 2. Samples: Two Samples of grating approximately 4 inches by 8 inches, showing at least four crossbars each and four bearing bars each. One Sample will be retained at Site to be used as a basis for acceptance or rejection of grating installed.

CITY OF WHITE HOUSE

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. Alabama Metal Industries Corporation (AMICO), Birmingham, AL.
 2. HARSCO Industrial KG., Houston, TX.
 3. Ohio Gratings, Inc., Canton, OH.
 4. McNichols Co. Inc, Tampa, FL.

2.02 GRATING MATERIALS

- A. Aluminum: Provide alloy and temper as designated below.
1. Bearing Bars and Banding: ASTM B221 alloy 6061-T6 or 6063-T6.
 2. Swaged Crossbar Rods: ASTM B221 alloy 6061 or 6063, or ASTM B210 alloy 3003.
 3. Finish: Mill.

2.03 METAL BAR GRATING

- A. General Requirements:
1. Maximum Service Load:
 - a. Light Duty (Type A): 100 psf uniformly distributed load.
 - b. Medium Duty (Type B): 500 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 inch maximum, center-to-center.
 - b. Medium Duty: 15/16 inch maximum, center-to-center.

4. Cross Bar Spacing: 4 inches maximum, center-to-center. For aluminum I-bar grating with depths greater than 2 inches, provide cross bars at 2 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. Aluminum, pressure-locked I-bar grating fabricated by swaging crossbars between extruded I-shaped bearing bars.

C. Surface: Striated.

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 PLANK STYLE GRATING

1. Light Duty (Type A): 100 psf uniformly distributed load.
2. Maximum Deflection: Span/240 or 1/4 inch, whichever is less.
3. Material: Aluminum.
4. Style: Interlocking sides
5. Surface: Striated surface.
6. Openings: Coordinate with Process Piping and Equipment, see Drawings.

2.05 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 inch 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.

2.06 ACCESSORIES

A. Embedded Frames:

1. As indicated on Drawings and as specified in Section 05 50 00, Metal Fabrications.
2. Extruded aluminum frames as manufactured by:
 - a. Ohio Gratings, Inc., Canton, OH.
 - b. Thompson Fabricating, LLC, Tarrant, AL.

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.
5. At Embedded Extruded Aluminum:
 - a. Provide aluminum clip, bolt, nut, and washer, with clip engaging bottom flange of I-bar.
 - b. Manufacturers and Products:
 - 1) Direct Metals Company, LLC, Kennesaw, GA; Plank Clip.
 - 2) Thompson Fabricating Company, Inc., Birmingham, AL; TFCO Standard Hold Down Clip.

2.07 FABRICATION

A. General:

1. In accordance with NAAMM MBG 531 or NAAMM MBG 532.
2. Do not weld aluminum grating.
3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. 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.
6. Do not notch bearing bars at supports to maintain elevation.
7. Field measure areas to receive grating. Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
8. 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.
9. 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.
10. 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 PREPARATION

- A. Electrolytic Protection:
 - 1. Protect aluminum surfaces in contact with dissimilar metals, or embedded or in contact with masonry, grout, or concrete as specified in Section 09 90 00, Painting and Coating.
 - 2. Allow paint to dry before installation of material.

3.02 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 06 10 00
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Forest and Paper Association (AF&PA): 2, National Design Specification for Wood Construction.
 2. American Hardboard Association (AHA): A135.4, Basic Hardboard.
 3. American Lumber Standards Committee's Board of Review (ALSC).
 4. American Wood Preservers' Association (AWPA):
 - a. U1, User Specification for Treated Wood.
 - b. M4, Standard for the Care of Preservative-Treated Wood Products.
 5. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - c. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - d. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - e. F1667, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
 6. Composite Panel Association (CPA): A208.1, Standard for Particleboard.
 7. International Code Council (ICC):
 - a. ESR-1539, Power-Driven Staples and Nails.
 - b. International Building Code (IBC).
 8. National Fire Protection Association (NFPA): 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.
 9. Southern Pine Inspection Bureau (SPIB): 1003, Grading Rules.
 10. Underwriters' Laboratories, Inc. (UL): 723, Standard for Safety Test for Surface Burning Characteristics of Building Materials.
 11. U.S. Department of Commerce—Voluntary Product Standard (DOC):
 - a. PS 1, Structural Plywood.
 - b. PS 2, Performance Standard for Wood-Based Structural-Use Panels.
 - c. PS 20, American Softwood Lumber Standard.

1.02 SUBMITTALS

A. Action Submittals:

1. ICC Evaluation Service Reports, including the following as a minimum:
 - a. Connections and Fasteners.
 - b. Wood Treatment.
 - c. Nails.
2. Wood treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
3. Material Certificates: Showing species and grade selected for dimension lumber for each use.
 - a. Material certificates for dimensional lumber in compliance with allowable unit stresses. Show species and grade selected for each use as well as design values approved by the ALSC's Board of Review.
 - b. For each type of preservative-treated wood product, include certification by treatment plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
4. Material test reports from testing laboratory showing and interpreting test results in accordance with test methods UL 723, NFPA 255, and ASTM E84, relative to fire-retardant treated wood products.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Upon delivery to Site, immediately place materials in area protected from weather. Do not store seasoned materials in wet or damp areas.
- B. Protect sheet materials from breaking corners and damaging surfaces while unloading.
- C. Store materials a minimum of 6 inches above ground on framework or blocking and cover with waterproof covering, providing for adequate air circulation and ventilation. Store sheet materials flat, not on edge.
- D. Protect fire-retardant materials against high humidity and moisture during storage and erection.
- E. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
- F. Store materials for which maximum moisture content is specified in areas where humidity can be controlled.

PART 2 PRODUCTS

2.01 GENERAL

- A. Lumber Standards:
 - 1. In accordance with DOC PS 20 and applicable grading rules and wood species certified by ALSC.
 - 2. Design values for wood members equal to those published in supplement to AF&PA 2.
 - 3. Stamp or brand each unexposed piece of lumber with grade, species, and moisture content at time of mill surfacing.
 - 4. Furnish exposed lumber pieces with grade stamps applied to ends or back of each piece. If completely exposed, and permitted by local building jurisdiction, omit grade stamps entirely.
- B. Lumber sizes shown on Drawings are nominal, unless shown otherwise. Provide actual sizes as required by DOC PS 20 for use.
- C. Dressed lumber S4S, unless shown otherwise on Drawings.
- D. Moisture content of lumber not to exceed 19 percent, unless otherwise specified and marked "DRY".
- E. Each plywood panel identified with designated grade trademark of APA.

2.02 LUMBER

- A. Framing lumber shall be Douglas Fir-Larch, No. 1 or better unless indicated otherwise below:

Usage	Minimum Grade
Plates, sills, blocking, furring, braces, and nailers	Douglas Fir-Larch No. 2, Hemlock, Southern Pine Stud grade, nondense

2.03 CONSTRUCTION PANELS

- A. Plywood Backing Panel: Mounting electrical, telephone, and like equipment; provide fire-retardant treated plywood panel with grade designation, APA C-D Plugged Exposure 1, in thickness shown on Drawings, or, if not shown on Drawings, not less than 15/32 inch.

2.04 COMPOSITE WALL PANELS

- A. NūFiber™ Wall Panels or equal:
1. Fiberglass Reinforced Plastic (FRP) laminated to plywood substrate
Texture: PebbledSubstrate: Plywood; Thickness: 0.500 inch.
 2. Fire-Rating Class: A.
 3. Color: Standard Finish: White.
 4. Size: 4 feet by 10 feet.
 5. Moldings: Coordinating PVC (polyvinyl chloride) moldings, color: White.

2.05 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

- A. Where lumber or plywood is indicated as preservative-treated wood, in accordance with AWPA U1 and AWPA M4, mark and grade each treated item in accordance with SPIB 1003 or WWPA G5.
1. Kiln-dry after treatment to maximum moisture content of 19 percent.
 2. Treat wood in contact with roofing or flashing.
 3. Treat wood in contact with masonry or concrete.
 4. Treat wood less than 18 inches above grade.
- B. Aboveground Materials:
1. Pressure treat items with waterborne preservatives to a minimum retention of 0.25 per cubic foot.
 2. Interior Use: After treatment, kiln-dry lumber and plywood to maximum moisture content of 19 percent and 15 percent respectively.
 3. Treat the following items:
 - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
- C. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.06 FIRE-RETARDANT TREATED WOOD

- A. Pressure treat lumber and plywood with fire-retardant chemicals in accordance with applicable AWWA U1 and AWWA M4 standard for species, product, preservative and end use to ensure flame-spread rating not higher than 25 with no evidence of significant progressive combustion when tested for 30 minutes duration under UL 723 and ASTM E84.
- B. Treated lumber and plywood labeled and tested by Underwriters' Laboratories, Inc. shall show performance rating.

2.07 HARDWARE

- A. Fasteners and connectors in contact with preservative-treated or fire-retardant-treated wood shall be hot-dipped zinc-coated galvanized steel or stainless steel in accordance with ASTM A153/A153M.
- B. Conform to ASTM F1667.
- C. Nails:
 - 1. Conform to ASTM F1667.
 - 2. Steel common nails or alternatives listed in rough carpentry section of General Structural Notes found on Drawings.
 - 3. Use hot-dipped zinc-coated nails wherever exposed.
 - 4. Use deformed shank nails for fastening underlayment.
- D. Staples: Conform to ASTM F1667, galvanized where exposed.
- E. Power Driven Fasteners: Conform to ICC ESR-1539.
- F. Bolts and Screws: Conform to ASTM A307, galvanized where exposed.

2.08 MISCELLANEOUS

- A. Construction Adhesives: Elastomeric glue conforming to ASTM D3498 for gluing subfloor to joists.
- B. Roofing Felt: Asphalt-saturated organic felt conforming to ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify surfaces to receive rough carpentry materials are prepared to exact grades and dimensions.

3.02 GENERAL

- A. Lay out, cut, fit, and install rough carpentry items. Anchor sufficiently to ensure rigidity and permanence.
- B. Install items accurate to dimension, true to line, level, and square unless shown otherwise on Drawings. Provide for installation and support of other Work.
- C. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.
- D. Countersink nail heads on exposed carpentry work and fill holes.
- E. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- F. Field cuts and holes in pressure-treated lumber and timber shall be field treated with preservative in accordance with AWP A M4.
- G. Holes shall be 1/16 inch larger than nominal bolt diameter, except holes for cast-in-place anchor bolts shall be 3/16 inch larger than nominal bolt diameter. Tight holes requiring forcible driving of bolts shall be enlarged by reaming.
- H. Provide washers under bolt heads and nuts bearing on wood.

3.03 INSTALLATION

- A. Miscellaneous Framing:
 - 1. Fire Stops:
 - a. Stud Walls: 2 inches thick by depth of member blocking at each floor level and top story ceiling level, so placed that the maximum dimension of any concealed space is not over 10 feet.

- b. Floor and Ceiling Framing: 2 inches thick by depth of wood member blocking, fitted to fill openings from one space to another to prevent drafts.
 - c. Chimneys and Fireplaces: Keep wood framing minimum of 2 inches from outside face of masonry and 4 inches from fireplace back wall.
2. Framing for Mechanical Work:
- a. Frame members for passage of pipes and ducts to avoid cutting structural members.
 - b. Do not cut, notch, or bore framing members for passage of pipes or conduits without concurrence of Engineer. Reinforce framing members where damaged by cutting.

3.04 PRESERVATIVE-TREATED WOOD PRODUCTS

- A. Provide preservative-treated wood for framing, blocking, furring, nailing strips built into exterior masonry walls, wood in contact with concrete or masonry and in conjunction with gravel stops, and built-up roofing.
- B. Apply two brush coats of same preservative used in original treatment to sawed or cut surfaces of treated lumber.

3.05 FIRE-RETARDANT TREATED WOOD

- A. Provide fire-retardant treated lumber and for backing panels at electrical, telephones, and like equipment and where indicated on Drawings.
- B. Use FR-S rated wood on interior only.
- C. Use exterior rated wood outside and where relative humidity is above 80 percent.

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. Architectural Woodwork Institute Quality Certification Corporation (AWI QCC): Quality Certification Program.
 2. Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, Woodwork Institute (AWI, AWMAC, WI): Architectural Woodwork Standards.
 3. Builders Hardware Manufacturers Association (BHMA):
 - a. 156.9, Cabinet Hardware.
 - b. 156.11, Cabinet Locks.
 4. Federal Specifications (FS): A-A-1936, Adhesive, Contact, Neoprene Rubber.
 5. Hardwood Plywood and Veneer Association (HPVA): HP-1, Hardwood and Decorative Plywood.
 6. National Electrical Manufacturers' Association (NEMA): LD 3, High-Pressure Decorative Laminates (HPDL).
 7. Woodwork Institute (WI): Certified Compliance Program (CCP).

1.02 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Show details and dimensions not controlled by job conditions and required field measurements.
 - b. Describe and illustrate features of design showing field measurements, construction details, dimensions, materials, and finish.
 - 1) Use full-size or 1/4-size scale drawings.
 - 2) Key to Contract Drawings.
 - c. Furnish manufacturer's descriptive literature of specialty items not manufactured by woodwork manufacturer.
 2. Samples:
 - a. Each finish to be applied by woodwork manufacturer.
 - b. Casework unit complete with hardware, including locks and accessories, and top. Unit may be incorporated in the Work.
- B. Informational Submittals: Proof of woodwork manufacturer qualifications.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Successful completion of comparable work on similar size project within 2 years before start of construction on this Project.
2. Quality Standards: AWI, AWMAC, WI Architectural Woodwork Standards.
3. Current member of AWI.
4. Engineer reserves right to approve woodwork manufacturer selected to furnish Work.

B. Casework and Paneling:

1. Reference to Premium, Custom, or Economy Grade: As defined in AWI, AWMAC, WI Architectural Woodwork Standards.
2. Provide Custom Grade, unless otherwise specified.

C. Cabinet Hardware: In accordance with BHMA 156.9 and BHMA 156.11.

D. Work in this section shall be accomplished under the Quality Certification Program of AWI QCC.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Defer delivery to Site until installation and storage areas are complete and dry of wet type construction, and excessive moisture has been out of building for at least 10 days.
- B. Protect casework and paneling from damage and dampness. Store in weathertight, well-ventilated areas. Do not subject to extreme changes of temperature or humidity.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. For a minimum of 72 hours prior to installation, allow woodwork to come to equilibrium onsite in space where it is to be installed.
- B. Humidity: For 24 hours before, during, and after installation, maintain relative humidity between 25 percent and 55 percent.
- C. Temperature: For 24 hours before, during, and after installation, maintain ambient temperature between 65 degrees F and 75 degrees F.

PART 2 PRODUCTS

2.01 CASEWORK FINISH

- A. Plastic Laminate:
 - 1. Meet requirements of AWI, AWMAC, WI Architectural Woodwork Standards Section 10.
 - 2. Furnish casework exposed surfaces, including top, edges, front face, and backsplashes, with plastic laminate in colors indicated in Interior Finish Schedule.

2.02 CASEWORK HARDWARE

- A. Hinges: European style hinge; 626 satin chrome finish.
 - 1. Manufacturers:
 - a. Blum, Inc.
 - b. Grass America, Inc.
 - c. Stanley.
- B. Pulls: Solid brass or bronze, Stanley No. 4484, Baldwin No. 4676; 626 satin chrome finish.
- C. Heavy-Duty Drawer Slides: Knape and Vogt No. 1429 or Grant No. 4930.
- D. Heavy-Duty Shelf Supports: Knape and Vogt slotted standard No. 82 and bracket No. 182; or Stanley No. 6783 and 6785, clear anodized aluminum finish.

2.03 PLASTIC LAMINATE

- A. Counter Tops:
 - 1. NEMA LD 3, Grade GP 50; solid color, standard velvet finish.
 - 2. Color as indicated in Interior Finish Schedule.
 - 3. Manufacturers and Products:
 - a. Wilson Art; Tuf-Surf.
 - b. Westinghouse; Micarta.
 - c. Formica Corp.
- B. General Use and Paneling: NEMA LD 3, Grade GP 38; in colors indicated in Interior Finish Schedule.

2.04 ANCILLARY MATERIALS

A. Adhesives:

1. Plastic Laminate: Contact cement; FS A-A-1936.

B. Hardware: Furnish fasteners and miscellaneous hardware required for assembling and anchoring woodwork, including casework.

2.05 FABRICATION

A. Moisture Content: Kiln dry lumber to an average moisture content range as follows:

1. Exterior Work: 9 percent to 15 percent.
2. Interior Work: 5 percent to 10 percent.

B. Casework Construction: AWI, AWMAC, WI Architectural Woodwork Standards Section 10, Custom Grade, flush overlay.

C. Casework Fronts: Plastic laminate.

D. Casework Units: Shop assembled for field installation.

E. Install concealed hinges on doors.

F. Drawer Slides: Use side-mounted, heavy-duty type.

G. Install casework hardware in accordance with manufacturer's instructions.

1. Provide items where indicated and as required for a complete installation.
2. Provide pulls and catches on casework doors unless indicated otherwise.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine grounds, stripping, and blocking for cabinet attachment.

B. Do not proceed to install until conditions are acceptable to installer.

C. Verify surfaces to receive architectural woodwork items are properly prepared.

3.02 CASEWORK INSTALLATION

- A. Coordinate installation of, and cut openings for mechanical, electrical, and other items that penetrate casework surfaces and tops.
- B. Install casework in true alignment, level, and plumb.
- C. Secure units with nails or screws to cleats that have been anchored to building structure or wall framing.
- D. Install wall-hung cabinets to rigidly support cabinet weight plus normally expected weight of cabinet contents.
- E. Accurately scribe and closely fit faceplates, filler strips, and trim strips to irregularities of adjacent surfaces.
- F. Adhere plastic laminate as recommended by laminate manufacturer.
 - 1. Apply with as few cross joints as possible and no longitudinal joints.
 - 2. Scribe neatly to vertical surfaces.
- G. Toe Space at Front of Cabinets: Provide by installing front face of cabinets 3 inches in front of base face.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware and leave in smooth working condition.
- B. Adjust doors and drawers to operate without restriction.
- C. Surfaces: Clean and ready for use.
- D. Staining or Discoloration of Finish: Restore to original finish or replace unit.

END OF SECTION

SECTION 06 82 00
GLASS-FIBER-REINFORCED PLASTIC

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. C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
 - b. D570, Standard Test Method for Water Absorption of Plastics.
 - c. D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position.
 - d. D638, Standard Test Method for Tensile Properties of Plastics.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D696, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 Degrees C and 30 Degrees C.
 - g. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - h. D792, Standard Test Methods for Density and Specific Gravity (Relative Density) by Plastics Displacement.
 - i. D2344, Standard Test Method for Apparent Interlaminar Shear Strength of Parallel Fiber Composites by Short-Beam Method.
 - j. D2583, Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - k. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
2. Occupational Safety and Health Act (OSHA): 29 CFR 19.10, Code of Federal Regulations.
3. Underwriters' Laboratories, Inc. (UL): 94, UL Standard for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.02 DESIGN REQUIREMENTS

A. This section contains components and connectors that require Contractor design.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Product Data: Catalog information and catalog cuts showing materials, design tasks, and showing load, span, and deflection; include manufacturer's specifications.
 - b. Grating: Show dimensions, weight, size, and location of connections to adjacent grating, supports, and other Work.
 - c. Grating Supports: Show dimensions, weight, size, location, and anchorage to supporting structure.
 - d. Stairs, Platforms, Stringers, Handrails, Ladders, and Support Structures:
 - 1) Show dimensions, weight, size, and location of connections to adjacent supports and other Work.
 - 2) Structural calculations for platforms, ladders and cages, handrails, and other fabrications shown.
2. Samples: Each type of grating, handrail, and handrail connection.

B. Informational Submittals:

1. Handling and storage requirements.
2. Manufacturer's installation instructions.
3. Factory test reports for physical properties of product.
 - a. Test data for handrails and supports may supplement load calculations providing data covers the complete system, including anchorage.
 - b. Test data for all components showing load and deflection due to load, in enough detail to prove handrail is strong enough and satisfies national, state, local standards, regulations, code requirements, and OSHA 29 CFR 19.10, using design loads specified.
 - c. Include test data for the following:
 - 1) Railing and post connections.
 - 2) Railing wall connections.
 - 3) Post and base connections.
 - 4) Railing expansion joint connections.
4. Manufacturer's Certification of Compliance for specified products.
5. Fabricator's qualification experience.
6. Manufacturer's qualification experience.
7. Independent laboratory test report, dated within 2 years of submittal date, of fire retardant testing conducted on exact type of grating proposed (not a resin test report).

1.04 QUALIFICATIONS

- A. Designer: Calculations required for Contractor design shall be stamped by a registered engineer, licensed in state where Project will be constructed.
- B. Fabricator: Minimum of 5 years' experience.
- C. Manufacturer: Minimum of 5 years' experience in manufacturing of products meeting these specifications.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipment:
 - 1. Insofar as is practical, factory assemble items provided hereunder.
 - 2. Ladders shall be shipped fully shop-fabricated and assembled.
 - 3. Package and clearly tag parts and assemblies that are of necessity shipped unassembled in a manner that will protect materials from damage, and facilitate identification and final assembly in field.
- B. Storage and Handling: In accordance with manufacturer's recommendations and in such a manner as to prevent damage of any kind, including overexposure to sunlight.

PART 2 PRODUCTS

2.01 GENERAL

- A. Like Items of Materials: Where possible, provide end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.
- B. Unless otherwise specified, all products shall be manufactured by a pultruded process using vinyl ester resin.
- C. Products shall be manufactured with ultra-violet (UV) inhibitor additives.
- D. Exterior surfaces shall have a synthetic surface veil covering.
- E. Furnish molded products as an option where permitted by specifications.
- F. Fire Retardance:
 - 1. Flame spread shall be less than 25 as measured by ASTM E84.
 - 2. Include combinations of aluminum trihydrate, halogen, and antimony trioxide, where required to meet fire retardance, in the resin system.
 - 3. Meet self-extinguishing requirements of ASTM D635.

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- G. Color pigment shall be dispersed in resin system.
- H. Fabricate FRP products exposed to outdoor conditions with an additional 1-mil thick UV coating to shield product from UV light.
- I. All cut ends, holes, and abrasions of FRP shapes shall be sealed with resin to prevent intrusion of moisture.

2.02 GRATING AND STAIR TREADS

A. General:

- 1. 100 psf minimum, unless otherwise shown.
- 2. Maximum Deflection: 1/4 inch, unless otherwise shown.
- 3. Stair Tread: 100 psf uniform load or concentrated load of 300 pounds on area of 4 square inches located in center of tread, whichever produces greater stress.

B. Molded Type:

- 1. Nonskid grit affixed to top of bar surface or a concave, meniscus top to all bars, providing skid resistance.
- 2. Load bars in both directions with equal stiffness.
- 3. Square mesh with 1-1/2-inch maximum spacing.

C. Pultruded Type:

- 1. Main bars joined by cross bars secured in holes drilled in main bars.
- 2. Cross bars with 6-inch maximum spacing shall mechanically lock main bars in position such that they prevent movement.
- 3. Intersections: Bond using adhesive as corrosive-resistant as pultrusion resin.
- 4. Main Bar Ends: Minimum bearing support width of 1-1/2 inches.
- 5. Skid-Resistant Surface: Grit adhesively bonded, manufacturer's standard.
- 6. Provide extra stiffness around openings.

D. Hold-Down Clamps: Same material as grating or Type 316 stainless steel.

E. Bolts and Connectors:

- 1. Corrosion-resistant FRP or Type 316 stainless steel.
- 2. Size and strength to meet UBC requirements.

F. Fabrications:

1. Field measure areas to receive grating. Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
2. Section Length: Sufficient to prevent it falling through clear opening when oriented in span direction when one end is touching either concrete or vertical leg of grating support.

G. Manufacturers:

1. Fibergrate Composite Structures, Inc., Addison, TX.
2. IKG/Borden, Clark, NJ.
3. Strongwell Corp., Bristol Division, Bristol, VA or Chatfield Division, Chatfield, MN.
4. International Grating, Inc., Houston, TX.

2.03 LADDERS AND CAGES

A. Ladder Criteria:

1. Capable of supporting a 250-pound concentrated load plus 30 percent impact at midspan of rung.
2. Side Rails: 1-3/4-inch square tubes, 0.25 inch thick.
3. Rungs: Minimum 1-inch diameter thermal cure rod with pigmented epoxy, nonskid grit surface, or 1-1/4-inch minimum diameter pultruded, fluted, nonslip surface of vinyl ester resin.

B. Cage Criteria:

1. Capable of withstanding a 200-pound load in any direction at any location without permanent distortion.
2. Top and Bottom Hoops: 3-inch minimum width by 1/4-inch minimum thickness.
3. Intermediate Hoops: 2-inch minimum width by 1/4-inch minimum thickness.
4. Hoops manufactured by open-mold hand layup process.
5. Vertical Connecting Straps to Hoops:
 - a. 2-inch-wide by 3/16-inch-thick or 2-inch-wide by 9/16-inch pultruded channels.
 - b. Maximum Spacing: 9 inches.
6. Maximum Vertical Distance Between Hoops: 3 feet 6 inches.

C. Manufacturers:

1. Strongwell Corp., Bristol, VA.
2. Fibergrate Composite Structures, Inc., Addison, TX.

PART 3 EXECUTION

3.01 GENERAL

- A. Install in accordance with manufacturer's written instructions.
- B. Install plumb or level, rigid and neat, as applicable.
- C. Furnish fasteners and anchorages for complete installation.
- D. Seal field cut holes, edges, and abrasions with catalyzed resin compatible with original resin.

3.02 GRATING

- A. Anchor grating securely to supports to prevent displacement.
- B. Install each grating section such that it is easily removable.
- C. Clearance (Grating to Vertical Surfaces): 1/4 inch (plus or minus 1/8-inch tolerance).

3.03 STRUCTURAL SHAPES

- A. Connect parts with approved connectors meeting manufacturer's design requirements and with corrosion resistance equal to structural shapes.
- B. Provide supports and bracings required to comply with applicable codes and design requirements.

3.04 LADDERS AND CAGES

- A. Epoxy and rivet joints and rungs.
- B. Attach hoops to maintain full width clearance between rails, full height of ladder.

END OF SECTION