

**SPECIFICATIONS**  
**FOR**  
**NORTHERN KENTUCKY**  
**WATER DISTRICT**

Fort Thomas Treatment Plant  
Basin Improvements

January 2015

COMPILED BY:  
NORTHERN KENTUCKY WATER DISTRICT  
2835 Crescent Springs Road  
P.O. Box 18640  
Erlanger, Kentucky 41018

# **S P E C I F I C A T I O N S**

**FOR**

**NORTHERN KENTUCKY WATER DISTRICT**

## **Fort Thomas Treatment Plant Basin Improvements**

**January 2015**

**GOVERNING BODY**

**COMMISSIONERS:**

**DR. PATRICIA SOMMERKAMP– CHAIR  
DAVID M. SPAULDING ESQ. - VICE-CHAIR  
FRED A. MACKE, JR. - SECRETARY  
CLYDE CUNNINGHAM - TREASURER  
ANDREW C. COLLINS - COMMISSIONER  
DOUG C. WAGNER - COMMISSIONER**

**RON LOVAN, PRESIDENT/CEO**

**COMPILED BY:**

**Northern Kentucky Water District  
2835 Crescent Springs Road  
P.O. Box 18640  
Erlanger, Kentucky 41018**

**FOTP BASIN IMPROVEMENTS  
NORTHERN KENTUCKY WATER DISTRICT**

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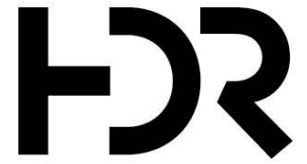
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A - KENTUCKY DIVISION OF WATER APPROVAL LETTER

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## **D I V I S I O N 0**

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**Bidding Requirements, Contract  
Documents and Standard General  
Conditions**

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Section 00020

INVITATION TO BID

Date of Advertisements: January 15, 2015 and February 5, 2015

PROJECT: Fort Thomas Treatment Plant Basin Improvements

SEALED BIDS WILL BE RECEIVED AT:

Northern Kentucky Water District (Owner)  
2835 Crescent Springs Road  
P.O. Box 18640  
Erlanger, Kentucky 41018

UNTIL: Date: February 24, 2015  
Time: 2:00 p.m., local time

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud.

The proposed Work is generally described as follows: repair of deteriorated concrete and removal of existing horizontal flocculators, clarifier sludge rakes, baffle walls, and rapid mixing equipment and replacement with concrete baffle walls, vertical impeller flocculators, sludge collection system, rapid mixer, slide gates, filter bay ceiling concrete coating restoration, and miscellaneous concrete repair, valve replacements, and electrical work.

All Bids must be in accordance with the Instructions to Bidders and Contract Documents on file, and available for examination at: Northern Kentucky Water District, 2835 Crescent Springs Road, Erlanger, Kentucky, 41018.

The Bidding Documents may be examined at the Owner's address above or HDR Engineering, Inc. at 2517 Sir Barton Way, Lexington, KY 40509.

Copies of the Bidding Documents may be obtained from ARC Document Solutions located at 1018 East New Circle Road, Suite 102, Lexington, KY 40505. Phone: (859)-699-5105. Website: [www.e-arc.com/ky/lexington](http://www.e-arc.com/ky/lexington) . Charges for all documents obtained will be made on the following basis:

	<u>Charge</u>
Complete set of Bidding Documents	\$ 170.00
Mailing and Handling (if requested)	\$ 15.00

Charges for Bidding Documents and mailing and handling, if applicable, will not be refunded.

A non-mandatory pre-bid conference will be held for prospective Bidders on February 6, 2015 at 9:30 a.m. at the Fort Thomas Treatment Plant located at 700 Alexandria Pike, Fort Thomas, Kentucky, 41075. If weather permits, a basin will be drained for Contractor viewing during the pre-bid.

On request 72 hours in advance, Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of a Bid. Arrangements for site visits shall be made by calling Kevin Owen, with the Northern Kentucky Water District at (859) 547-3277.

Bids will be received on a lump sum basis as described in the Contract Documents.

Bid security, in the form of a certified check or a Bid Bond (insuring/bonding company shall be rated "A" by AM Best) in the amount of ten percent (10%) of the maximum total bid price, must accompany each Bid.

The Successful Bidder will be required to furnish a Construction Payment Bond and a Construction Performance Bond (insuring/bonding company shall be rated "A" by AM Best) as security for the faithful performance of the contract and the payment of all bills and obligations arising from the performance of the Contract.

The project advertised will be funded by the Kentucky Infrastructure Authority (KIA) through a Federally Assisted Drinking Water State Revolving Fund (DWSRF) Loan and Local Funds. The Successful Bidder must comply with the related DWSRF Loan requirements as detailed in the Bidding Documents.

All Bidders must comply with the President's Executive Order 11246 (EEO) as amended.

All Bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, the Davis-Bacon Act, the Implementation of American Iron and Steel (Buy American) provisions P.L. 113-76 of the Consolidated Appropriations Act, and the Contract Work Hours Standard Act and 40 CFR 31.36.

All Bidders, Contractors, and Subcontractors must comply with 41 CFR 60-4, in regards to Affirmative Action, to ensure equal opportunity to females and minorities and will apply the timetables and goals set forth in 41 CFR 60-4 as applicable.

All Bidders must comply with OSHA (P.C. 91-596) and the Contract Work Hours and Safety Standards Act (P.E. 91-54).

Contractor and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents. This project falls under the provisions of KRS 337.505 to 337.550 for prevailing wage rates. Evaluation of Bids and the awarding of a final contract are subject to the reciprocal preference for Kentucky resident bidders pursuant to KRS 45A.490 to 45A.494 and (KAR 200 5:400).

Owner reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, non-responsive, incomplete, unbalanced, or conditional Bids, to waive informalities, and to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of Owner to make an award to that Bidder. Owner also reserves the right to negotiate with the apparent qualified Bidder to such an extent as may be determined by Owner.



Minority Bidders are encouraged to bid and Bidders must employ good faith effort steps to solicit participation of small, minority, women owned and disadvantaged business enterprises.

Bids shall remain subject to acceptance for 90 days after the day of bid opening or for such longer period of time to which a Bidder may agree in writing upon request of the Owner. If a Contract is to be awarded, the Owner will give the successful Bidder a Notice of Award during the period of time which the successful Bidder's Bid remains subject to acceptance.

Richard Harrison, Vice President of Engineering, Production & Distribution  
Northern Kentucky Water District

End of Section

Section 00100

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS. Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

- A. *Bidder* - The individual or entity who submits a Bid directly to Owner.
- B. *Successful Bidder* - The lowest responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2. COPIES OF CONTRACT DOCUMENTS. Complete sets of Contract Documents must be used in preparing Bids; Bidder shall have sole responsibility for errors or misrepresentations resulting from the use of incomplete sets of Bidding Documents.

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 confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS. To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be requested by Owner. Bidders who have not, in the Owner's opinion, had sufficient experience in the size and type of work involved may not be considered.

Each Bid must contain evidence of Bidder's qualifications to transact business in the State of Kentucky or covenant to obtain such qualifications prior to award of the Contract. The Bidder's Organization Number from the Kentucky's Secretary of State and principal place of business as filed with Kentucky's Secretary of State must be included where applicable.

Each Bidder must be registered as a plan holder with the Issuing Office or Engineer on record in the advertised "Invitation to Bid". There shall be no substitution of bidders without proper registration with the Issuing Office or Engineer on record in the advertised "Invitation to Bid"

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE. It is the responsibility of each Bidder, before submitting a Bid, to:

- a. thoroughly examine and study the Instructions to Bidders and the Contract Documents, including any Addenda;
- b. visit the Site and become familiar with and satisfy Bidder as to the general, local, and site conditions that may affect cost, progress, performance, or furnishing of the Work;
- c. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, or furnishing of the Work;

- d. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Contract Documents;
- e. correlate the information known to Bidder, information and observations obtained from visits to the Site, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents;
- f. promptly give Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Contract Documents and confirm that the written resolution thereof by Owner is acceptable to Bidder; and
- g. determine that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.01. Underground Facilities. Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner or others, and Owner and Engineer disclaim responsibility for the accuracy or completeness thereof, unless it is expressly provided otherwise in the Supplementary Conditions.

4.02. Additional Information. Before submitting a Bid, each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to subsurface or physical conditions at or contiguous to the Site or otherwise, which may affect cost, progress, performance, or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents. Each Bidder shall be responsible for any claims for personal injury, death or damage to property caused by Bidder's entry on public or private property and shall defend and indemnify Owner and all other parties against any such claims.

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

5. SITE AND OTHER AREAS. The Site is identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor. Easements for permanent structures or permanent

changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

6. INTERPRETATIONS AND ADDENDA. All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner in writing. Any interpretations or clarifications that are considered necessary by Owner in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Owner as having received the Bidding Documents. Questions received less than 72 hours prior to the date for opening of Bids may not be answered. The person submitting questions shall be responsible for their prompt delivery. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

Owner will not be responsible for explanations or interpretations of the Bidding Documents or Contract Documents except as issued in accordance herewith.

7. BID SECURITY. Each Bid must be accompanied by Bid security made payable to Owner in an amount of 10 percent of Bidder's maximum Bid price and in the form of a Bid Bond (on the form attached) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions and shall be rated "A" by AM BEST.

Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and Bid security of that Bidder will be forfeited. Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or one day after the last day the Bids remain subject to acceptance, whereupon Bid security furnished by such Bidders will be returned.

8. CONTRACT TIMES. The numbers of calendar days within which, or the dates by which, the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement.

9. LIQUIDATED DAMAGES. Provisions for liquidated damages, if any, are set forth in the Agreement.

10. SUBSTITUTE OR "OR-EQUAL" ITEMS. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Owner, application for such acceptance will not be considered by Owner until after the Effective Date of the Agreement. The procedure for submission of any such application by Contractor and consideration by Owner is set forth in the General Conditions and may be supplemented in the General Requirements.

11. PREPARATION OF BID. The Bid form is included with the Bidding Documents. Additional copies may be obtained from Owner.

All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each lump sum bid item and/or unit price item listed therein, or the words "No Bid", "No Change", or "Not Applicable" entered.

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

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

A Bid by a limited liability company shall be executed in the name of the firm by a member (if member-managed) or manager (if manager-managed) and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

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

A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.

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

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

The address and telephone number for communications regarding the Bid shall be shown.

The Bid shall identify whether the Bidder is a resident or nonresident bidder for purposes of Kentucky's reciprocal preference statute (KRS 45A.490 to 45A.494 and 200 KAR 5:400). If the Bidder is claiming a "resident bidder" status as defined in KRS 45A.494(2), the Bid shall include a properly executed and notarized affidavit affirming that it meets the criteria to be considered such a resident bidder. If requested by Owner, Bidder shall also provide documentation proving such resident bidder status; failure to do so shall result in disqualification of the Bidder or contract termination.

While the Bidder should consult the applicable statutes and regulation, generally speaking, a "resident bidder" is an individual or business entity that, on the date the contract is first advertised or announced as available for bidding: (a) is authorized to transact business in the Commonwealth; AND (b) has for one (1) year prior to and through the date of the advertisement, (i) filed Kentucky corporate income taxes, (ii) made payments to the Kentucky unemployment insurance fund established in KRS 341.490, and (iii) maintained a Kentucky workers' compensation policy in effect. A "nonresident bidder" is any other individual or business entity.

12. BASIS OF BID. Bidders shall submit a Bid on a lump sum basis. Discrepancies between words and figures will be resolved in favor of the words.

13. SUBMITTAL OF BID. A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "Bid Enclosed".

Bids shall be addressed to Owner at:

Northern Kentucky Water District (Owner)  
2835 Crescent Springs Road  
P.O. Box 18640  
Erlanger, Kentucky 41018

One complete and executed Bid Form along with "Non-Collusion Affidavit", "Resident Bidder Status Affidavit", if applicable, Supplements to Bid Form, and Bid Bond shall be submitted. Bids shall be typed or in ink. Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Bids received after the time and date for receipt of Bids may be returned unopened. Oral, telephone, facsimile, or telegraph Bids are invalid and will not receive consideration.

14. MODIFICATION AND WITHDRAWAL OF BIDS. A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. For a period ending 72 hours after Bids are opened, any Bidder may request the withdrawal of its Bid by filing with Owner a duly signed written notice and otherwise demonstrating by clear and convincing evidence to the reasonable satisfaction of Owner that the Bid was submitted in good faith but there was a material and/or substantial mistake in the preparation of its Bid. If the withdrawal of the Bid is approved by the Owner in its sole discretion, the Bid security will be returned. Without the advanced full disclosure by the withdrawing Bidder to and written consent of the Owner, (a) no Bid shall be withdrawn under this section when the result would be the awarding of the contract on another Bid of the same Bidder or of another Bidder in which the withdrawing Bidder has a direct or indirect equitable interest and (b) no Bidder who is permitted to withdraw a Bid shall, for compensation, supply any material or labor to or perform any subcontract or other work agreement for the Bidder to whom the contract is awarded or otherwise benefit, directly or indirectly, from the performance of the Project.

15. OPENING OF BIDS. 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.

16. BIDS TO REMAIN SUBJECT TO ACCEPTANCE. 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.

17. AWARD OF CONTRACT. Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, incomplete, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder which it finds, after reasonable inquiry and evaluation, to be non-responsive. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Owner to make an award to that Bidder. Owner also reserves the right to waive all informalities and to negotiate with the apparent Successful Bidder to such an extent as may be determined by Owner. The Owner also reserves the right to increase or decrease the quantities of work per the General Conditions.

In evaluating Bids, Owner will consider, among other lawful considerations, the following:

- a. Whether or not the Bid complies with the prescribed requirements, and provides such alternates, unit prices and other information or data as may be requested in the Bid Form or prior to the Notice of Award.
- b. The qualifications of the Bidder.
- c. If the Bidder maintains a permanent place of business.
- d. If the Bidder has adequate personnel, plant and equipment to perform the Work properly and expeditiously.
- e. Bidder's financial status to meet all obligations and incidentals to the Work.
- f. Whether the Bidder has appropriate technical expertise and experience.
- g. Bidder's performance record.
- h. The amount of the TOTAL BASE BID, exclusive of any additive alternates, if applicable. Any additive alternates will be considered after selection of the lowest Total Base Bid. Each additive alternate will be considered and selected or not selected individually, at Owner's discretion, for inclusion in the work.

In addition, the evaluation of Bids will be subject to the reciprocal preference for Kentucky resident bidders pursuant to KRS 45A.490 to 45A.494 and KAR 200 5:400. These statutes and regulation provide in part as follows: (a) a resident bidder of the Commonwealth shall be given a preference against a nonresident bidder registered in any state that gives or requires a preference to bidders from that state; (b) the preference shall be equal to the preference given or required by the state of the nonresident bidder; (c) this preference shall not be applied against nonresident bidders residing in states that do not give preference against Kentucky bidders; (d) if a procurement determination results in a tie between a resident bidder and a nonresident bidder, preference shall be given to the resident bidder; and (e) the preference shall not result in a nonresident bidder receiving a preference over another nonresident bidder.

Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders to perform the Work in accordance with the Contract Documents, including, without limitation, a Bidder's claim that it is a resident bidder for purposes of Kentucky's preference statute.

18. CONTRACT SECURITY AND INSURANCE. Article 5 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 executed Agreement to Owner, it must be accompanied by such Bonds.

19. SIGNING OF AGREEMENT. When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents identified in the Agreement as attached thereto. Within 15 days thereafter, the Successful Bidder shall sign, leaving the dates blank, and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 15 days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

20. RETAINAGE. Provisions concerning retainage are set forth on the Agreement.

21. DRINKING WATER STATE REVOLVING FUND LOAN. A portion of the funding for this project comes from a Drinking Water State Revolving Fund (DWSRF) loan. This loan originates with the United States Environmental Protection Agency (USEPA) and has several provisions that directly impact the Bidder. These include:

1. A certificate that the Bidder and any subcontractors used by the Bidder are not on the Federal List of Debarred Contractors. (CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER MATTERS – EPA Form 5700-49) addresses this item and must be executed and included with the Bid.
2. A certificate from the Bidder that no appropriate funds were or will be used for the purpose of lobbying the legislative or executive branches of the Federal government. (CERTIFICATION REGARDING LOBBYING) addresses this item and must be submitted with the Bid.

The DWSRF loan creates additional documentation requirements on both the Contractor and the Owner. These are set forth in the Supplemental General Conditions for Drinking Water State Revolving Fund Loans (DWSRF Supplemental General Conditions). The items identified, but not limited to, in this section must be submitted with the Bid. The remaining items identified in the DWSRF Supplemental General Conditions Section will be submitted by the apparent successful bidder within 21 days of the Bid opening. The project will not be awarded until this information is received.

DWSRF funding requires a recipient to utilize minority or women owned businesses as subcontractors where possible. Certain information and documentation is required by the funding agencies and other governing bodies prior to awarding a necessary approval for this Project. The Bidder acknowledges, through the act of submitting a Bid, a commitment to submit the following documentation or information within 7 days of Bid opening. Failure to produce any of this documentation or information within the prescribed period will serve as grounds for rejection of the Bid. If the information is required from a subcontractor or vendor and is not produced within the prescribed period, it will serve as grounds to replace the subcontractor or vendor with another company or product if directed by the Owner at that time.

Specific items to be submitted within 7 days of the Bid opening include:



- A. EPA Form 6100-2, DBE Subcontractor Participation
- B. EPA Form 6100-3, DBE Subcontractor Performance
- C. EPA Form 6100-4, DBE Subcontractor Utilization
- D. Disadvantaged Enterprise Participation Policy
- E. List of DBE Bidders of Subcontractors

22. “BUY AMERICAN” PROVISION. In accordance with the Consolidated Appropriations Act, the Contractor agrees to adhere to the Implementation of American Iron and Steel Provisions P.L. 113-76 in the performance of the Work.

23. GENERAL CONTRACTOR COMPLIANCE.

Contractor agrees to comply with the President’s Executive Order 11246 (EEO) as amended.

Contractor agrees to comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, the Davis-Bacon Act, the Implementation of American Iron and Steel (Buy American) provisions P.L. 113-76 of the Consolidated Appropriations Act, and the Contract Work Hours Standard Act and 40 CFR 31.36.

Contractor agrees to comply with 41 CFR 60-4, in regards to Affirmative Action, to ensure equal opportunity to females and minorities and will apply the timetables and goals set forth in 41 CFR 60-4 as applicable.

Contractor agrees to comply with OSHA (P.C. 91-596) and the Contract Work Hours and Safety Standards Act (P.E. 91-54).

Contractor agrees to conform to the labor standards set forth in the Contract Documents. This project falls under the provisions of KRS 337.505 to 337.550 for prevailing wage rates.

End of Section

Section 00300

BID FORM

PROJECT IDENTIFICATION: **Fort Thomas Treatment Plant Basin Improvements**

THIS BID IS SUBMITTED TO:

Northern Kentucky Water District (Owner)  
P.O. Box 18640  
2835 Crescent Springs Road  
Erlanger, Kentucky 41018

THIS BID IS SUBMITTED BY: \_\_\_\_\_  
(Bidder's Company Name)

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Contract Documents to perform all Work as specified or indicated in the Contract Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Invitation to Bid and the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time to which the Bidder may agree in writing upon request of Owner. Bidder understands that certain extensions to the time for acceptance of this Bid may require the consent of the surety for the Bid Bond.
3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:
  - a. Bidder has examined and carefully studied the Contract Documents, the other related data identified in the Contract Documents, and the following Addenda, receipt of all of which is hereby acknowledged:  
No. \_\_\_\_\_ Dated \_\_\_\_\_  
No. \_\_\_\_\_ Dated \_\_\_\_\_  
No. \_\_\_\_\_ Dated \_\_\_\_\_
  - b. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work, including, but not limited to, those specific to the Drinking Water State Revolving Fund Loan and Prevailing Wage provisions.
  - d. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests,

studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

- e. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- 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 correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- h. Bidder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.
- i. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- j. [Check the one that applies]

\_\_\_\_\_ Bidder is a “resident bidder” as defined in KRS 45A.494(2) of Kentucky’s resident bidder reciprocal preference statute AND submits with this Bid a properly executed and notarized Affidavit that affirms that Bidder meets the resident bidder criteria, which Affidavit is hereby incorporated herein and made a part of this Bid.

OR

\_\_\_\_\_ Bidder is a “nonresident bidder” as defined in KRS 45A.494(3) of Kentucky’s resident bidder reciprocal preference statute AND its principal place of business as identified its Certificate of Authority to transact business in Kentucky as filed with Kentucky’s Secretary of State or, if Bidder hereby represents and covenants that it is not required to obtain a Certificate of Authority to transact business in Kentucky, its mailing address, is:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- k. Bidder's Organization Number from Kentucky's Secretary of State is # \_\_\_\_\_ [if applicable] and Bidder is qualified to transact business in the State of Kentucky or hereby covenants to obtain such qualifications prior to award of the Contract.
4. Bidder further represents that 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 agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.
5. The Bidder understands and agrees that during the performance of the Contract, it shall maintain a presence within such proximity of the Site which will allow it to respond to an emergency at the Site within one hour of receiving notice of an emergency, including emergencies occurring during non-working hours. The Bidder shall provide a list of emergency phone numbers for such purposes. If the Bidder does not have such a presence, it may satisfy this requirement by sub-contracting with a sub-contractor that does have such a presence, provided that any such sub-contractor must be approved by the Owner, in its sole discretion, prior to the project pre-construction meeting.
6. Bidder will complete the Work for the following unit prices (see bid schedule):

**BID SCHEDULE**

<b>Bid Item</b>	<b>Bid Item Description</b>	<b>Unit</b>	<b>Est. Qty.</b>	<b>Unit Price</b>	<b>Amount</b>
<b>Item 1</b>	<b>Walkway Surface Repair</b>				
1a	Overall Walkway Area to be Repaired - General Repair	SF	1000		
1b	Crack Repair	LF	150		
1c	Spalled Surface Area Repair	SF	200		
<b>Item 2</b>	<b>Typical Basin Crack Repair</b>				
2a	Crack Repair	LF	3000		
<b>Item 3</b>	<b>Existing Filter Building Structural Concrete Repair</b>				
3a	Beam Repair Method A	LF	85		
3b	Beam Repair Method B	LF	35		
3c	Beam Repair Method C	LF	15		
3d	Ceiling Repair Method A	SF	800		
3e	Wall and Columns	SF	24		
<b>Item 4</b>	<b>General Construction (of FTTP Basin Improvements Project)</b>				
4a	Item 4(a) includes all work depicted or implied in the project plans and specifications that is <u>not</u> included in work items 1-3 above.	LS	1		
	<b>TOTAL BASE BID (in numbers)</b>				

**TOTAL BASE BID (in words)** \_\_\_\_\_  
 \_\_\_\_\_.

	<b>Additive Alternatives</b>				
1	Additive Alternate No. 1 (as described in Specification Section 01030, Part 2.1A)	LS	1		

**ADDITIVE ALTERNATIVE NO. 1 (in words)** \_\_\_\_\_

\_\_\_\_\_.

7. Bidder agrees that the Work will be substantially complete in the amount of calendar days as set forth in the agreement. Bidder agrees that the Work will be complete and ready for final payment in the amount of calendar days as set forth in the agreement.

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

8. References

	Contact Person	Company Name	Phone No.	Project Name
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____

SUBMITTED on \_\_\_\_\_, 2015.

9. Communications concerning this Bid shall be sent to Bidder at the following address:

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

10. The terms in this Bid, which are defined in the General Conditions included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.

**SIGNATURE OF BIDDER**

**If an Individual**

Name (typed or printed): \_\_\_\_\_

By \_\_\_\_\_ (SEAL)  
*(Individual's signature)*

doing business as \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Date \_\_\_\_\_

**If a Partnership**

Partnership Name: \_\_\_\_\_ (SEAL)

By \_\_\_\_\_  
*(Signature of general partner - attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No.: \_\_\_\_\_

Date \_\_\_\_\_

**If a Corporation**

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General, Professional Service): \_\_\_\_\_

By \_\_\_\_\_  
*(Signature - attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_ (CORPORATE SEAL)

Attest \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No.: \_\_\_\_\_

Date \_\_\_\_\_

**If a Limited Liability Company**

Company Name: \_\_\_\_\_ (SEAL)

State of Organization: \_\_\_\_\_

Type (General, Professional): \_\_\_\_\_

By \_\_\_\_\_  
*Signature of Member or Manager (as applicable)- attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_ (COMPANY SEAL)

Attest \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No.: \_\_\_\_\_

Date \_\_\_\_\_



**If a Joint Venture**

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

Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
*(Signature - attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

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

Business address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Date \_\_\_\_\_

Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
*(Signature - attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

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

Business address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Date \_\_\_\_\_

**SECTION 00430**  
**BID BOND**

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

BIDDER (Name and Address):

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

OWNER (Name and Address):

**BID**

Bid Due Date:

Project (Brief Description Including Location):

**BOND**

Bond Number:

Date (Not later than Bid due date):

Penal sum \_\_\_\_\_  
(Words) (Figures)

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

**BIDDER**

**SURETY**

\_\_\_\_\_  
Bidder's Name and Corporate Seal (Seal)

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest By: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

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

## PENAL SUM FORM

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2. All Bids are rejected by Owner, or
  - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

**END OF SECTION**

Section 00460

NON-COLLUSION AFFIDAVIT

STATE OF: \_\_\_\_\_ )

COUNTY OF: \_\_\_\_\_ ) SS

\_\_\_\_\_, being first duly sworn, deposes

and says that he/she is the \_\_\_\_\_ of  
(sole owner, a partner, president, secretary, etc.)

\_\_\_\_\_, the party making the foregoing bid; that such bid is genuine and not collusive or sham; that said bidder is not financially interested in, or otherwise affiliated in a business way with any other bidder on the same contract; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding, and has not in any manner directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the price or affidavit of any other bidder, or that of any other bidder, or to secure any advantage against Owner, or any person or persons interested in the proposed Contract; and that all statements contained in said bid are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information of data relative thereto to any association or to any member or agent thereof.

\_\_\_\_\_  
AFFIANT

Sworn to and subscribed before me, a Notary Public in and for the above named

State and County, this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

\_\_\_\_\_  
NOTARY PUBLIC

End of Section



*(Note: The following standard form will be used for )  
(preparation of the Agreement, after award of contract.)*

Section 00500

AGREEMENT

THIS AGREEMENT is made and entered by and between the Northern Kentucky Water District (herein called Owner) and \_\_\_\_\_ (herein called Contractor).

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

Article 1. WORK.

Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: repair of deteriorated concrete and removal of existing horizontal flocculators, clarifier sludge rakes, baffle walls, and rapid mixing equipment and replacement with vertical impeller flocculators, sludge rakes, mixer, and sluice gates and miscellaneous concrete and electrical work.

Article 2. ENGINEER.

The Project has been designed by HDR Engineering, Inc., 2517 Sir Barton Way, Lexington, KY, 40509, who is referred to in the Contract Documents as Engineer. Engineer, and its duly authorized agents, are 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 completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIMES, LIQUIDATED DAMAGES, DELAYS, AND DAMAGES.

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.

3.1. Contract Times. The Work will be substantially completed within **347 calendar days** after the date when the Contract Times commence to run as provided in paragraph 2.03(A) of the General Conditions, and completed and ready for final payment in accordance with Article 14 of the General Conditions within **375 calendar days** after the date when the Contract Times commence to run.

3.2. Liquidated Damages. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expenses, and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$750.00

for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times or any proper extension thereof granted by Owner, Contractor shall pay Owner as liquidated damages (but not as a penalty) \$500.00 for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment until the Work is completed and ready for final payment.

Owner shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Contractor, or to initiate action to recover liquidated damages for nonperformance of this Contract within the time stipulated.

3.3. Delays and Damages. In the event Contractor is delayed in the prosecution and completion of the Work because of any delays caused by Owner or Engineer, Contractor shall have no claim against Owner or Engineer for damages (including but not limited to acceleration costs or damages) or contract adjustment other than an extension of the Contract Times and the waiving of liquidated damages during the period occasioned by the delay.

Contractor shall provide advance written notice to Owner and Engineer of Contractor's intention to accelerate the Work prior to commencing any acceleration. Such written notice shall include a detailed explanation of the nature and scope of the acceleration, the reason for the acceleration, the anticipated duration of the acceleration, and the estimated additional costs to Contractor, if any, related to the acceleration. This requirement shall not in any way affect or alter the agreement of Owner and Contractor with respect to delays and damages as set forth above and in the General Conditions and Supplementary Conditions. Owner shall not be responsible or liable for any acceleration costs or damages.

Article 4. CONTRACT PRICE.

Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents funds a total amount of:

\_\_\_\_\_ (\$ \_\_\_\_\_ )  
(words) (figures)

as indicated in Contractor's bid.

Article 5. PAYMENT PROCEDURES.

Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions and as modified by the Supplementary Conditions.

5.1. Progress Payments. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by the Engineer monthly during construction as provided in the General Conditions. All progress payments will be on the basis of the progress of the work measured by the schedule of values established in accordance with paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the

number of units completed).

5.2. Retainage. In addition to any amounts withheld from payment in accordance with Paragraph 14.02 of the General Conditions, Owner shall retain from progress payments amounts equal to the following percentages:

- a. Ten percent (10%) of the amount of the Work completed. This amount may be reduced by the Owner in its sole and absolute discretion, if the project is substantially completed; and
- b. Ten percent (10%) of the value of materials and equipment that are not incorporated in the Work but are delivered, suitably stored, and accompanied by documentation satisfactory to Owner as provided in paragraph 14.02.A.1 of the General Conditions. Retainage for stored materials and equipment will be released when the materials and equipment are incorporated in the Work.

All retainage will be paid to Contractor when the Work is completed and ready for final payment in accordance with paragraph 14.07.C of the General Conditions. Consent of the Surety shall be obtained before retainage is paid by Owner. Consent of the Surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the Surety.

5.3. Final Payment. Upon final completion and acceptance of the Work in accordance with paragraphs 14.07.B and 14.07. C. of the General Conditions, Owner shall pay the remainder of the Contract Price as provided in paragraph 14.07.B and 14.07.C.

## Article 6. CONTRACTOR'S REPRESENTATION

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

- a. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Contract Documents.
- b. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- c. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work, including, but not limited to, those specific to the Drinking Water State Revolving Fund Loan.
- d. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by



Contractor, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by Contractor, and safety precautions and programs incident thereto.

- e. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- f. 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 correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- h. Contractor has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Owner is acceptable to Contractor.
- i. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

#### Article 7. CONTRACT DOCUMENTS.

The Contract Documents, which are incorporated as part of this Agreement, consist of the following:

- A. This Agreement;
- B. Performance Bond;
- C. Payment Bond;
- D. General Conditions;
- E. Supplementary Conditions;
- F. SRF Supplementary Conditions;
- G. Specifications;
- H. Drawings consisting of a cover sheet followed by 46 additional sheets, with each sheet dated 01/15/15 and bearing the following general title;  
Northern Kentucky Water District  
Fort Thomas Treatment Plant Basin Improvements
- I. Addenda (numbers \_\_\_ to \_\_\_, inclusive);
- J. Exhibits to this Agreement (enumerated as follows):
  - 1. Notice of Award and Notice to Proceed;
  - 2. Contractor's Bid;
  - 3. Documentation submitted by Contractor prior to Notice of Award;
- K. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

1. Written Amendments;
2. Work Change Directives;
3. Change Orders.

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.04.A and 3.04.B of the General Conditions.

#### Article 8. COMPLIANCE WITH KENTUCKY LAW

Contractor represents and warrants that it has revealed to Owner any and all final determinations of a violation of KRS Chapters 136, 139, 141, 337, 338, 341, and 342 by Contractor or any subcontractor within the past five years. Contractor further represents and warrants that it and each of its subcontractors will remain in continuous compliance with the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 for the duration of this Agreement. Contractor understands that its failure to reveal a final determination of a violation or to comply with the above statutory requirements constitutes grounds for cancellation of the Agreement and for disqualification of Contractor from eligibility for any contracts for a period of two years.

#### Article 9. EQUAL OPPORTUNITY

Unless exempted under KRS 45.590, during the performance of this Agreement, Contractor agrees as follows:

1. Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age forty (40) and over, disability, veteran status, or national origin;
2. Contractor will take affirmative action in regard to employment, upgrading, demotion, transfer, recruitment, recruitment advertising, layoff, termination, rates of pay or other forms of compensation, and selection for training, so as to ensure that applicants are employed and that employees during employment are treated without regard to their race, color, religion, sex, age forty (40) and over, disability, veteran status, or national origin;
3. Contractor will state in all solicitations or advertisements for employees placed by or on behalf of Contractor that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age forty (40) or over, disability, veteran status, or national origin;
4. Contractor will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provisions of the nondiscrimination clauses required by this section; and
5. Contractor will send a notice to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or

understanding advising the labor union or workers' representative of Contractor's commitments under the nondiscrimination clauses.

Article 10. MISCELLANEOUS.

- a. Terms used in this Agreement will have the meanings indicated in the General Conditions.
- b. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- c. Owner and Contractor each binds itself, its partners, successors, assigns, and representatives to the other party hereto, its partners, successors, assigns, and representatives in respect of all covenants, agreements, and obligations contained in the Contract Documents.
- d. 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.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. One counterpart each has been delivered to Owner, Contractor, Surety, and Engineer.

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

OWNER: Northern Kentucky Water District

\_\_\_\_\_

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

Address for giving notices

2835 Crescent Springs Road  
P.O. Box 18640  
Erlanger, Kentucky 41018

CONTRACTOR: \_\_\_\_\_

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

(Corporate Seal)

Address for giving notices

\_\_\_\_\_

\_\_\_\_\_

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

**SECTION 00610**  
**PERFORMANCE BOND**

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

CONTRACTOR (Name and Address):

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

OWNER (Name and Address):

**CONTRACT**

Date:  
Amount:  
Description (Name and Location):

**BOND**

Bond Number:  
Date (Not earlier than Contract Date):  
Amount:

Modifications to this Bond Form: Delete subparagraph 3.3.2 in its entirety. Delete the wording of subparagraph 4.3 and replace it with the following wording: (NOT USED). Delete all additional references to subparagraph 4.3.

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

**CONTRACTOR AS PRINCIPAL**

Company:

Signature: \_\_\_\_\_ (Seal)  
Name and Title:

**SURETY**

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

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

Attest: \_\_\_\_\_  
Signature and Title

**CONTRACTOR AS PRINCIPAL**

Company:

Signature: \_\_\_\_\_ (Seal)  
Name and Title:

**SURETY**

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title:

**EJCDC No. C-610 (2002 Edition)**

**Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.**

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.
2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.
3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
  - 3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
  - 3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and
  - 3.3. Owner has agreed to pay the Balance of the Contract Price to:
    1. Surety in accordance with the terms of the Contract;
    2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:
  - 4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
  - 4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
  - 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
  - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
    1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
    2. Deny liability in whole or in part and notify Owner citing reasons therefor.
5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:
  - 6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;
  - 6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and
  - 6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.
7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.
8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
12. Definitions.
  - 12.1. Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
  - 12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
  - 12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
  - 12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone  
 Surety Agency or Broker  
 Owner's Representative (engineer or other party)

**END OF SECTION**

**SECTION 00615**  
**PAYMENT BOND**

CONTRACTOR (Name and Address):

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

OWNER (Name and Address):

**CONTRACT**

Date:

Amount:

Description (Name and Location):

**BOND**

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form: (1) Delete the wording of Paragraph 6 in its entirety and replace it with the following: Reserved.

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

**CONTRACTOR AS PRINCIPAL**

Company:

Signature: \_\_\_\_\_ (Seal)

Name and Title:

**SURETY**

\_\_\_\_\_  
(Seal)

Surety's Name and Corporate Seal

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

Signature and Title

(Attach Power of Attorney)

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

Attest: \_\_\_\_\_

Signature and Title

**CONTRACTOR AS PRINCIPAL**

Company:

Signature: \_\_\_\_\_ (Seal)

Name and Title:

**SURETY**

\_\_\_\_\_  
(Seal)

Surety's Name and Corporate Seal

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

Signature and Title

(Attach Power of Attorney)

Attest: \_\_\_\_\_

Signature and Title:

**EJCDC No. C-615 (2002 Edition)**

**Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.2. Pay or arrange for payment of any undisputed amounts.

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

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

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

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

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

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

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

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

## 15. DEFINITIONS

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

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

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

**FOR INFORMATION ONLY – Name, Address and Telephone**

**Surety Agency or Broker:**

**Owner's Representative (engineer or other party):**

## END OF SECTION



**PART 1 – CONTRACTOR’S APPLICATION FOR PAYMENT**

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

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer)
Project:	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		
TOTALS				
NET CHANGE BY CHANGE ORDERS				

<b>1. ORIGINAL CONTRACT PRICE</b> .....	\$	
<b>2. Net change by Change Orders</b> .....	\$	
<b>3. CURRENT CONTRACT PRICE (Line 1 ± 2)</b> .....	\$	
<b>4. TOTAL COMPLETED AND STORED TO DATE</b>		
(Column F on Progress Estimate) .....	\$	
<b>5. RETAINAGE:</b>		
a. ____ % x \$ _____ Work Completed .....	\$	
b. ____ % x \$ _____ Stored Material .....	\$	
c. Total Retainage (Line 5a + Line 5b) .....	\$	
<b>6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)</b> .....	\$	
<b>7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)</b> .....	\$	
<b>8. AMOUNT DUE THIS APPLICATION</b> .....	\$	
<b>9. BALANCE TO FINISH, PLUS RETAINAGE</b>		
(Column G on Progress Estimate + Line 5 above).....	\$	

**CONTRACTOR’S CERTIFICATION**

The undersigned Contractor certifies that: (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 Work covered by prior Applications for Payment; (2) title of 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 Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:
-----	-------

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

**Progress Estimate**

**Contractor's Application**

For (contract):			Application Number:					
Application Period:			Application Date:					
A		B	Work Completed		E	F		G
Item		Scheduled Value	C	D	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (E) B	Balance to Finish (B - F)
Specification Section No.	Description		From Previous Application (C + D)	This Period				
Totals								

**Progress Estimate**

**Contractor's Application**

For (contract):						Application Number:						
Application Period:						Application Date:						
A				B	C	D	E	F		G		
Item				Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (E) B	Balance to Finish (B - F)
Bid Item No.	Description											
Totals												

# Stored Material Summary

# Contractor's Application

For (contract):				Application Number:						
Application Period:				Application Date:						
A	B	C		D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage (\$) (D + E - F)	
			Date (Month/Year)	Amount (\$)	Amount (\$)	Subtotal	Date (Month/Year)	Amount (\$)		
		Totals								

**PART 2 – FIELD ORDER**

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

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

**Attention:**

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.05A., for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: \_\_\_\_\_ (Specification Section(s)) \_\_\_\_\_ (Drawing(s) / Detail(s))

Description:

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Attachments:

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Engineer:
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Receipt Acknowledged by (Contractor):	Date:
---------------------------------------	-------

Copy to Owner

**PART 3 – WORK CHANGE DIRECTIVE**

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

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

**You are directed to proceed promptly with the following change(s):**

Item No.	Description

**Attachments (list documents supporting change):**

---



---

**Purpose for Work Change Directive:**

- Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

  - Nonagreement on pricing of proposed change.
  - Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

**Estimated change in Contract Price and Contract Times:**

Contract Price \$ \_\_\_\_\_ (increase/decrease)      Contract Time \_\_\_\_\_ days (increase/decrease)

If the change involves an increase, the estimated amounts are not to be exceeded without further authorization.

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Accepted for Contractor by:	Date
Approved by Funding Agency (if applicable):	Date:

**PART 4 – CHANGE ORDER**

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

Date of Issuance: \_\_\_\_\_ Effective Date: \_\_\_\_\_

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

**The Contract Documents are modified as follows upon execution of this Change Order:**

Description:  
 \_\_\_\_\_  
 \_\_\_\_\_

Attachments: (List documents supporting change):  
 \_\_\_\_\_  
 \_\_\_\_\_

<b>CHANGE IN CONTRACT PRICE:</b>	<b>CHANGE IN CONTRACT TIMES:</b>
Original Contract Price:  \$ _____	Original Contract Times: <input type="checkbox"/> Working days <input type="checkbox"/> Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:  \$ _____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order:  \$ _____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order:  \$ _____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order:  \$ _____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

<b>RECOMMENDED:</b>	<b>ACCEPTED:</b>	<b>ACCEPTED:</b>
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable): _____		Date: _____

# Change Order

## Instructions

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### A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

### B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

**END OF SECTION**



This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

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

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

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

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# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
  7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.



27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

### B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

### C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

### D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. does not conform to the Contract Documents; or
  - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
  - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

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

## **ARTICLE 2 – PRELIMINARY MATTERS**

### *2.01 Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

### *2.02 Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### *2.03 Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

## 2.04 *Starting the Work*

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

## 2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
  - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
  - 2. a preliminary Schedule of Submittals; and
  - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

## 2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

## 2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on

Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

### **ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

#### **3.01 *Intent***

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

#### **3.02 *Reference Standards***

- A. Standards, Specifications, Codes, Laws, and Regulations
  1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

#### B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
  - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
  - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

### 3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;
2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
3. Engineer's written interpretation or clarification.

### 3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
  2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

### 3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.



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

### **4.01 *Availability of Lands***

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

### **4.02 *Subsurface and Physical Conditions***

- A. *Reports and Drawings:* The Supplementary Conditions identify:
  - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
  - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
  - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
  - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

#### 4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
  2. is of such a nature as to require a change in the Contract Documents; or
  3. differs materially from that shown or indicated in the Contract Documents; or
  4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

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

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

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

- c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
  - a. reviewing and checking all such information and data;
  - b. locating all Underground Facilities shown or indicated in the Contract Documents;
  - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
  - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

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

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 4.05 *Reference Points*

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

#### 4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 5 – BONDS AND INSURANCE**

### **5.01 *Performance, Payment, and Other Bonds***

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### **5.02 *Licensed Sureties and Insurers***

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also

meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

#### 5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

#### 5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

- a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
  - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
  2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
  3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
  4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
  5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
  6. include completed operations coverage:
    - a. Such insurance shall remain in effect for two years after final payment.
    - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.



## 5.05 *Owner's Liability Insurance*

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

## 5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
  2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
  3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
  5. allow for partial utilization of the Work by Owner;
  6. include testing and startup; and
  7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

#### 5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

#### 5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

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

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

interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

**ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES**

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

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

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

#### 6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
  - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
  - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

#### 6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
  - 1. "*Or-Equal*" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
    - a. in the exercise of reasonable judgment Engineer determines that:
      - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
  - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
  - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
  - 1) shall certify that the proposed substitute item will:
    - a) perform adequately the functions and achieve the results called for by the general design,
    - b) be similar in substance to that specified, and
    - c) be suited to the same use as that specified;
  - 2) will state:
    - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
    - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

- c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
  - 3) will identify:
    - a) all variations of the proposed substitute item from that specified, and
    - b) available engineering, sales, maintenance, repair, and replacement services; and
  - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

#### 6.06 *Concerning Subcontractors, Suppliers, and Others*

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

required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
  2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner,



Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

#### 6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### 6.08 *Permits*

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

## 6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

## 6.10 *Taxes*

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

## 6.11 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought

by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### 6.12 *Record Documents*

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

#### 6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and

shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### 6.14 *Safety Representative*

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

#### 6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

#### 6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is

required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

#### 6.17 *Shop Drawings and Samples*

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

##### 1. *Shop Drawings:*

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

##### 2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

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

##### C. *Submittal Procedures:*

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

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

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

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

## 6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  - 1. observations by Engineer;
  - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
  - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  - 4. use or occupancy of the Work or any part thereof by Owner;
  - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
  - 6. any inspection, test, or approval by others; or
  - 7. any correction of defective Work by Owner.

## 6.20 *Indemnification*

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

- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
  - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

#### 6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.



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

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### *7.01 Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
1. written notice thereof will be given to Contractor prior to starting any such other work; and
  2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

### *7.02 Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  2. the specific matters to be covered by such authority and responsibility will be itemized; and
  3. the extent of such authority and responsibilities will be provided.

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

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

**ARTICLE 8 – OWNER'S RESPONSIBILITIES**

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

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

8.12 *Compliance with Safety Program*

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

**ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION**

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or

continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

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

#### 9.03 *Project Representative*

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

#### 9.04 *Authorized Variations in Work*

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

#### 9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

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

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

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not

exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

#### 9.10 *Compliance with Safety Program*

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

### **ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

#### 10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

## 10.02 *Unauthorized Changes in the Work*

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

## 10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
  - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

## 10.04 *Notification to Surety*

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

## 10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data

shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
  2. approve the Claim; or
  3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

### **11.01 *Cost of the Work***

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:



1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of

said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not

limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

#### 11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
  1. Contractor agrees that:
    - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
    - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance:*
  1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

#### 11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to

the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  - 2. there is no corresponding adjustment with respect to any other item of Work; and
  - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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

### *12.01 Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
  - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

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

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
  - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
  - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
  - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
  - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
  - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
  - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

#### 12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

#### 12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or

neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

### *13.01 Notice of Defects*

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

### *13.02 Access to Work*

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

### 13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

### 13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

#### 13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:



1. repair such defective land or areas; or
  2. correct such defective Work; or
  3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

#### 13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

### 13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION**

### 14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

### 14.02 *Progress Payments*

#### A. *Applications for Payments:*

- 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an

Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

**B. *Review of Applications:***

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
  - a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or

- involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
- b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
    - a. to supervise, direct, or control the Work, or
    - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
    - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
    - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
    - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
  5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
    - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
    - b. the Contract Price has been reduced by Change Orders;
    - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
    - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended; or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before

final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
  - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
  - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
  - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and
  - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

##### B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying

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

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
  1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
  2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.



## ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

### 15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

### 15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
  2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  3. Contractor's repeated disregard of the authority of Engineer; or
  4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
  2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
  3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when

so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

#### 15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
  - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
  - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days

to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

## **ARTICLE 16 – DISPUTE RESOLUTION**

### *16.01 Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
  2. agrees with the other party to submit the Claim to another dispute resolution process; or
  3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

## **ARTICLE 17 – MISCELLANEOUS**

### *17.01 Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

#### 17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

#### 17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

#### 17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

#### 17.05 *Controlling Law*

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

#### 17.06 *Headings*

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

## SECTION 00800

### SUPPLEMENTARY CONDITIONS

SCOPE. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (C-700, 2007 Edition) and other provisions of the Contract Documents as indicated herein. All provisions which are not so amended or supplemented remain in full force and effect.

#### SC-1. DEFINITIONS AND TERMINOLOGY.

SC-1.01. DEFINED TERMS. The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract (C-700, 2007 Edition) have the meanings assigned to them in the General Conditions.

Amend the terms as follows:

3. Application for Payment: Strike out the word "Engineer" and insert the word "Owner" in its place.
9. Change Order: Strike out the words "recommended by Engineer".
12. Contract Documents: In the first sentence, strike out the word "Engineer's" and insert the word "Owner's" in its place.
15. Contract Times: Strike out the words "as evidenced by Engineer's written recommendation of final payment".
16. Delete the term "Contractor" and substitute therefore the terms "Contractor or Prime Contractor."
17. Add the following sentence to the definition: "Drawings may also be described as Plans."
20. Field Order: Strike out the word "Engineer" and insert the word "Owner" in its place.
22. Delete the words " or Radioactive Material" and substitute therefore the words "Radioactive Material or other pollutants or contaminants".
44. Substantial Completion: Strike out the word "Engineer" and insert the word "Owner" in its place. Add the following to the first sentence: "and a Certificate of Substantial Completion has been completed."
51. Work Change Directive: In the first sentence strike out the words "and recommended by Engineer".

Additional terms used in these Supplementary Conditions have the meanings indicted herein, which are applicable to both the singular and plural thereof.

Add the following new definitions to paragraph 1.01:

- “52. Final Completion – The time when all work is complete, including all punch list items, and all documents required for occupancy of the facility are completed and submitted to the OWNER. These documents include, but are not limited to, Certificate of Occupancy, Letters of Approval from various regulatory agencies, inspection certificates, and all other items as required in paragraph 14.07.”
- “53. General Contractor – The person, firm, or corporation with whom OWNER has entered into an Agreement for a complete project, general trades, or complete project less a part of the project.”
- “54. Without exception – The term “without exception”, when used in the Contract Documents following the name of a Supplier or a proprietary item of equipment, product, or material, shall mean that the sources of the product are limited to the listed Suppliers or products and that no like, equivalent, or “or-equal” item and no substitution will be considered.”
- “55. Written Notice – Notice to any party which is in writing and which shall be considered delivered and the service thereof completed once posted by certified or registered mail to the party to whom the notice is sent at its last given address or delivered in person to said party or its authorized representative on the work.”

SC-102. TERMINOLOGY. Add the following paragraphs G, H, and I.

"G. Imperative Mood. These specifications are written to the BIDDER before the award of the Contract and to the CONTRACTOR after award of the Contract. The sentences that direct the CONTRACTOR to perform work are mostly written as commands. For example, a requirement to provide cold-weather protection would be expressed as, 'Provide cold-weather protection for concrete,' rather than 'The Contractor shall provide cold-weather protection for concrete.' In the imperative mood, the subject "the Bidder" or "the Contractor" is understood.

"H. Engineer Interpretations. In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that whenever anything is, or is to be, done, if, as, or, when, or where 'demonstrated, contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned,' it shall be understood as if the expression were followed by the words 'by the Engineer' or 'to the Engineer.'

"I. 'Shown.' When this term is used in the specifications, it means 'shown on the Drawings' unless stated otherwise."

SC-2. PRELIMINARY MATTERS.

SC-2.02. Copies of Documents. Delete the second sentence of paragraph 2.02.A and insert the following new sentence in its place:

“Five (5) sets of contract drawings and specifications will be furnished the Contractor without charge. Additional sets will be furnished upon request at the cost of reproduction. The Contractor shall keep one (1) set of approved plans and specifications on the site of the work. This set shall be kept current by addition of all approved changes, addenda and amendments thereto. One set of as-built plans shall be returned to the Owner after the project is complete.

The plans and specifications are intended to be complementary; but should any discrepancy appear or any misunderstanding arise as to the import of anything contained in either, the decision of the Owner shall be final and binding on the Contractor. The Owner may make any corrections of errors or omissions in the drawings and specifications when such corrections are necessary for the proper fulfillment of their intention as construed by the Owner.

All work or materials shown on the plans and not mentioned in the specifications or any work specified and not shown on the plans, shall be furnished, performed and done by the Contractor as if the same were both mentioned in the specifications and shown on the plans.

Should the Contractor in preparing its bid find anything necessary for the construction of the project that is not mentioned in the specifications or shown on the plans, or any discrepancy, it shall notify the Owner so that such items may be included. Should the Contractor fail to notify the Owner of such items, it will be assumed that its bid included everything necessary for the complete construction in the spirit and intent of the designs shown.

In case of discrepancy, figure dimensions shall govern over scale dimensions, large-scale details shall govern over small-scale drawings, plans shall govern over specifications, detailed technical specifications shall govern over general specifications, and the more restrictive specifications shall prevail.”

SC-2.03. Commencement of Contract Times; Notice to Proceed. Delete the paragraph and insert in its place:

"A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. The date for the Contract Times may be extended by mutual agreement between the OWNER and the CONTRACTOR."

SC-3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE. No modifications.

SC-4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS.

SC-4.02. Subsurface and Physical Conditions. Replace paragraph 4.02 with the following:

"A. Reports and Drawings:

"1. In preparation of the Contract Documents, the following drawings of physical conditions in or relating to the existing surface and subsurface structures (except underground facilities) which are at or contiguous to the Site of the Work were relied upon:

"a. Water Purification Works Covington, KY 1935 (Watkins)

"b. Ft. Thomas WTP Improvements Contract No. 87-5 1988 (B&N)

"c. Ft. Thomas WTP Improvements Contract 89-Z 1989 (B&N)

"d. Ft. Thomas WTP Improvements PSC Project BB 1991 (B&N)

"e. FTTP Tube Settler Replacement Basin #2 & #3 Quest/HDR (2005)

"2. CONTRACTOR may not rely upon or make any claim against OWNER or ENGINEER with respect to:

"a. 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

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

"c. Any CONTRACTOR interpretation of or conclusion drawn from any 'technical data' or any such other data, interpretations, opinions, or information.

SC-4.03. Differing Subsurface or Physical Conditions.

Replace paragraph 4.03.A with the following:

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

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

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

"3. Is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent on 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 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any work in connection therewith (except as aforesaid) until receipt of written order to do so."

#### SC-4.04. Underground Facilities.

Add the following immediately after paragraph 4.04.A.2.

##### "4.04.A.3 Location of Subsurface Utilities.

"a. The location of subsurface utilities is shown on the plans from information furnished by the utility owners.

"b. The CONTRACTOR shall, no later than 2 working days, excluding Saturdays, Sundays, and legal holidays, prior to construction in the area of the subsurface utility, notify the subsurface utility Owner in writing, by telephone, or in person. The marking or locating shall be coordinated to stay approximately 2 days ahead of the planned construction.

"c. The CONTRACTOR shall alert immediately the occupants of nearby premises as to any emergency that it may create or discover at or near such premises.

"d. The CONTRACTOR shall have full responsibility for coordination of the work with owners of such underground facilities during construction, for the safety and protection thereof as provided in paragraph 6.13 and repairing any damage thereto resulting from the work, the cost of all of which will be considered as having been included in the Contract Price.

"4.04.A.4 Where existing utilities and structures are indicated as being in the line of the proposed improvement, the CONTRACTOR shall expose them sufficiently in advance of the construction operations to permit adjustments in line or grade, if required, to eliminate interferences.

"4.04.A.5 Existing pipes or conduits crossing a trench, or otherwise exposed, shall be adequately braced and supported to prevent movement during construction.

##### "4.04.A.6 Broken Utility Services.

"a. Utility services broken or damaged shall be repaired at once to avoid inconvenience to customers and utility owners.

"b. Temporary arrangements, as approved by the ENGINEER, may be used until any damaged items can be permanently repaired.

"c. All items damaged or destroyed by construction and subsequently repaired must be properly maintained by the CONTRACTOR.

"d. CONTRACTOR must work 24 hours a day until service is restored to a damaged utility.

"4.04.A.7 Existing Utility Relocation.

"a. Where it is necessary to relocate an existing utility or structure, the work shall be done in such manner as is necessary to restore it to a condition equal to that of the original utility or structure.

"b. No such relocation shall be done until approval is received from the authority responsible for the utility or structure being changed."

SC-4.06 Hazardous Environmental Conditions at Site.

Delete paragraph 4.06.A. in its entirety and substitute the following paragraph therefore:

A. The following reports and drawings related to Hazardous Environmental Conditions identified at the Site are known to Owner: **None.**

Amend paragraph 4.06.B by adding the words "that is created by, or" immediately after the words "a Hazardous Environmental Condition" in the fourth line.

Amend paragraph 4.06.G by deleting all words following the words "Hazardous Environmental Condition" in the seventh line and substituting therefore the following words: "was created by Owner or by anyone for whom Owner is responsible, other than Contractor and all persons, subcontractors and entities for which Contractor is responsible."

SC-5. BONDS AND INSURANCE.

SC-5.02. Licensed Sureties and Insurers. Add the following new sentence at the end of paragraph 5.02.A:

The surety company shall be rated "A" by AM BEST.

SC-5.03. Certificates of Insurance. Add the following new sentence at the end of paragraph 5.03.A:

Contractor shall deliver to Owner properly completed certificates of insurance prior to the start of any Work at the Site, on the forms included in the Contract Documents.

SC-5.04. Contractor's Insurance.

Add the following new paragraphs immediately after paragraph 5.04.A.6:

7. Claims arising out of pollution and excluded from the Contractor's general liability and comprehensive automobile liability policies. This insurance shall be coordinated with the Contractor's general liability policy and shall provide

bodily injury and property damage coverage similar to the Contractor's general liability policy. Coverage shall include contractual liability.

Add the following new paragraphs immediately after paragraph 5.04.B.6:

7. contain a cross liability or severability of interest clause or endorsement. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance;
8. with respect to workers' compensation and employers' liability, comprehensive automobile liability, commercial general liability, and umbrella liability insurance, and all other liability insurance specified herein to be provided by Contractor, Contractor shall require its insurance carriers to waive all rights of subrogation against Owner, Engineer, and their respective officers, directors, partners, employees, and agents.

Add the following new paragraphs immediately after paragraph 5.04.B:

- C. The insurance required by paragraph 5.04 shall include coverage as necessary for the benefits provided under the United States Longshoremen's and Harbor Workers' Act and the Jones Act. This policy shall include an "all states" endorsement.
- D. The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts but shall provide coverage in greater amounts where required by Laws and Regulations. This coverage may be primary or a combination of primary and umbrella excess liability.
  1. Workers' Compensation, and related coverage under paragraphs 5.04.A.1 and 5.04.A.2 of the General Conditions:
    - a. State Statutory
    - b. Applicable Federal (e.g., Longshoreman's) Statutory
    - b. Employer's Liability \$1,000,000 each occurrence
  2. Commercial General Liability under paragraphs 5.04.A.3 through 5.04.A.6 of the General Conditions shall be occurrence type, written in comprehensive form, and shall protect Contractor, Owner, and Engineer as additional insureds, against claims arising from injuries, sickness, disease, or death of any person or damage to property arising out of performance of the Work. The policy shall also include a per project aggregate limit endorsement, personal injury liability coverage, contractual liability coverage for blasting, explosion, collapse of buildings, and damage to underground property.
    - a. General Aggregate \$1,000,000

- b. Products – Completed Operations Aggregate \$1,000,000
  - c. Personal and Advertising Injury \$1,000,000
  - d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
  - e. Property Damage liability insurance will provide Explosion, Collapse and Underground coverage's where applicable.
3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions shall be occurrence type, written in comprehensive form, and shall protect Contractor, Owner, and Engineer as additional insureds, against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles, either on or off the project site whether they are owned, nonowned, or hired. The liability limit shall be not less than:
- a. Bodily Injury
    - Each Person \$1,000,000
    - Each Accident \$1,000,000
  - b. Property Damage
    - Each Accident \$1,000,000
  - c. Combined Single Limit \$1,000,000
4. Umbrella Liability Insurance shall protect Contractor, Owner, and Engineer as additional insureds, against claims in excess of the limits provided under workers' compensation and employers' liability, comprehensive automobile liability, and commercial general liability policies. The umbrella policy shall follow the forms of the primary insurance, including the application of the primary limits. The liability limits shall be not less than:
- Bodily injury and Property damage \$4,000,000 combined single limit for each occurrence
  - \$4,000,000 general aggregate

SC-5.05. Owner's Liability Insurance. Delete paragraph 5.05 in its entirety and insert the following new paragraph in its place:

5.05. *Owner's Liability Insurance*. This insurance shall be obtained by Contractor and issued in the name of Owner, and shall protect and defend Owner against claims arising as a result of the operations of Contractor or Contractor's Subcontractors. The liability limits shall be not less than:

- a. Bodily Injury
  - Each Occurrence \$1,000,000

General Aggregate	\$1,000,000
b. Property Damage	
Each Occurrence	\$1,000,000
General Aggregate	\$1,000,000

SC-5.06. Property Insurance. Delete paragraph 5.06 in its entirety and insert the following new paragraphs in their place:

5.06. *Property Insurance*

A. Contractor shall purchase and maintain property insurance coverage upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;
2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment, 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, flood, damage caused by frost and freezing, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
3. 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 accepted by Owner;
4. include expenses incurred in the repair or replacement of any insured property (including, but not limited to, fees and charges of engineers and architects);
5. allow for partial utilization of the Work by Owner;
6. include testing and startup; and
7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer, with 30 days' written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Contractor shall be responsible for any deductible or self-insured retention.

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

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

#### SC-6. CONTRACTOR'S RESPONSIBILITIES.

SC-6.02. Labor; Working Hours. Add the following new paragraphs immediately after paragraph 6.02.B:

C. No Work shall be done between 6:00 p.m. and 7:00 a.m. without permission of Owner. However, emergency work may be done without prior permission.

D. Night Work may be undertaken as a regular procedure with the permission of Owner; such permission, however, may be revoked at any time by Owner if Contractor fails to maintain adequate equipment and supervision for the proper prosecution and control of the Work at night.

SC-6.05. Substitutes and "Or-Equals". Add the following new paragraph after paragraph 6.05.A.2.d:

e. "If a proposed substitute item is accepted, all incidental costs associated with the use of the substitute including, but not limited to, redesign, claims of other Contractors, changes to electrical supply equipment, additional equipment or material required for the installation, etc., shall be at the expense of the Contractor proposing the substitute unless otherwise agreed to by the Owner."

SC-6.06. Concerning Subcontractors, Suppliers, and Others. Delete paragraph 6.06.B in its entirety and insert the following new paragraph in its place:

B. Contractor must identify to Owner the following Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner by the date indicated: All subcontractors, flocculator vendor, clarifier sludge collection system vendor, rapid mixer #1 vendor, slide gate vendor, and valve and actuator vendors shall be named in the bid submittal. If Contractor has submitted a list thereof in accordance with these Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection

after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity without an increase in the Contract Price. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

SC-6.08. Permits. Add the following new paragraph immediately after paragraph 6.08.A:

B. Owner will obtain and pay for the following permits: Kentucky Division of Water

SC-6.09. Laws and Regulations. Add the following new paragraph immediately after paragraph 6.09.C:

D. Employment requirements shall be as specified herein and in the attachments at the end of the Supplementary Conditions.

SC-6.10. Taxes. Add the following new paragraph immediately after Paragraph 6.10.A of the General Conditions:

B. Portions of this project may be exempt from taxes. It is the Contractor's responsibility to determine any applicable exemptions.

SC-6.19. Contractor's General Warranty and Guarantee. Delete paragraph 6.19.C.7 and substitute the following new paragraph therefore:

7. any correction of defective Work by Owner; or

Add the following new paragraph immediately after paragraph 6.19.C.7:

8. any expiration of a correction period.

SC-7. OTHER WORK. No modifications.

SC-8. OWNER'S RESPONSIBILITIES. No modifications.

SC-9. ENGINEER'S STATUS DURING CONSTRUCTION.

SC-9.02. Visits to Site. Delete paragraph 9.02.A in its entirety and insert the following new paragraph in its place:

A. Engineer may make visits to the Site as Owner 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, at the request and benefit of Owner, may 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 advise Owner of the progress of the Work and will endeavor to guard Owner against defective Work.

SC-10. CHANGES IN THE WORK. No Modifications.

SC-11. COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK. No modifications.

SC-12. CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES.

SC-12.03. Delays Beyond Contractor's Control. Insert the following new paragraph 12.03.F immediately after paragraph 12.03.E:

F. In no event shall Owner or Engineer be liable to Contractor, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages (including acceleration costs) arising out of or resulting from any delay.

SC-12.04. Delay Damages. Add the following new paragraph after paragraph 12.03.

A. Except as set forth in paragraph 3.3 of the Agreement, in no event shall Owner or Engineer be liable to Contractor, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages (including acceleration costs) arising out of or resulting from any delay.

SC-13. TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK.

SC-13.02. Access to Work. Add the following new paragraph immediately after paragraph 13.02.A:

B. Authorized representatives of the U.S. Environmental Protection Agency and the Kentucky Division of Water shall have access to the Work whenever it is in preparation or progress. Contractor shall provide proper facilities for such access and inspection.

SC-13.07. Correction Period. Add the following new paragraph after paragraph 13.07.E:

F. Nothing in Article 13 concerning the correction period shall establish a period of limitation with respect to any other obligation which Contractor has under the Contract Documents. The establishment of time periods relates only to the specific obligations of Contractor to correct the Work, and has no relationship to the time within which Contractor's obligations under the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than to specifically correct the Work.

SC-14. PAYMENTS TO CONTRACTOR AND COMPLETION.

SC-14.02. Applications for Payments. Add the following new paragraphs immediately after paragraph 14.02.A.3:



4. Contractor's Applications for Payment shall be accompanied by the documentation specified herein.

5. Payments for stored materials and equipment shall be based only upon the actual cost to Contractor of the materials and equipment and shall not include any overhead or profit to Contractor. Partial payments will not be made for undelivered materials or equipment.

6. During the progress of the Work, each Application for Payment shall be accompanied by Contractor's updated schedule of operations, or progress report, with such shop drawings schedules, procurement schedules, value of material on hand included in application, and other data specified in Contract Documents or reasonably required by Owner.

Delete paragraphs 14.02.C in its entirety and insert the following new paragraphs in its place:

*C. Payment Becomes Due*

1. Twenty-five days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

SC-14.04. Substantial Completion. Add the following new paragraphs following paragraph 14.04.A:

To be considered substantially complete, the following portions of the Work must be operational and ready for Owner's continuous use as intended: All "in basin" work must be completed and all equipment and valves installed, started up, and ready for service.

Portions of the Work not essential to operation, which can be completed without interruption of the Owner's operation, may be completed after the Work is accepted as substantially complete, and may include the following items: Light poles, seeding, sodding, general cleanup, and "out of basin" painting.

SC-14.07. Final Application for Payment. Add the following new sentence immediately after the last sentence of paragraph 14.07.A.2.b.:

Consent of the surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the surety. The Contractor shall be responsible for providing all of the documents identified in this paragraph.

SC-15. SUSPENSION OF WORK AND TERMINATION.

SC-15.01 Owner may suspend Work. Delete the word "shall" in the fifth line of paragraph 15.01.A and substitute the word "may" therefore.

SC-16. DISPUTE RESOLUTION.

Delete Article 16 in its entirety and insert the following new article in its place:

ARTICLE 16 - DISPUTES.

Arbitration will not be acceptable as a means for settling claims, disputes, and other matters.

SC-17. MISCELLANEOUS.

SC-17.04. Survival of Obligations. Add the following new paragraph immediately after paragraph 17.04.A:

B. Contractor shall obtain from all Suppliers and manufacturers any and all warranties and guarantees of such Suppliers and manufacturers, whether or not specifically required by the Specifications, and shall assign such warranties and guarantees to Owner. With respect thereto, Contractor shall render reasonable assistance to Owner when requested, in order to enable Owner to enforce such warranties and guarantees. The assignment of any warranties or guarantees shall not affect the Correction Period or any other provisions of these Contract Documents.

End of Section

**SUPPLEMENTAL GENERAL CONDITIONS**  
**FOR**  
**CLEAN WATER STATE REVOLVING FUND**  
**DRINKING WATER STATE REVOLVING FUND**  
**(Drinking Water)**

**Project Name: Fort Thomas Treatment Plant  
Basin Improvements**

**Project Number: F14-15**

The attached instructions and regulations as listed below shall be incorporated into the Specifications and comprise Special Conditions.

	<u>Attachment No.</u>
<b>SRF Special Provisions</b>	<b>1</b>
<b>40 CFR 31.36 (Procurement)-grants only</b>	<b>2</b>
<b>KRS Chapter 45A-Kentucky Model Procurement Code-loans only</b>	<b>3</b>
<b>Equal Employment Opportunity (EEO) Documents:</b>	
<b>Notice of Requirement for Affirmative Action</b>	<b>4</b>
<b>Contract Specifications (Executive Order 11246)</b>	<b>5</b>
<b>EEO Goals for Region 4 Economic Areas</b>	<b>6</b>
<b>Special Notice #1 - Check List of EEO Documentation</b>	<b>7</b>
<b>Employer Information Report EEO-1 (SF 100)</b>	<b>8</b>
<b>Labor Standards Provisions for Federally Assisted Construction, EPA Form 5720-4</b>	<b>9</b>
<b>Certifications</b>	
<b>Debarment, Suspension and Other Responsibility Matters</b>	<b>10</b>
<b>Anti-lobbying</b>	<b>11</b>
<b>Region 4 Disadvantaged Business Enterprise (DBE)</b>	<b>12</b>
<b>Negotiated Rates as of October 1, 2010</b>	<b>13</b>
<b>Bonds and Insurance</b>	<b>14</b>
<b>Outlay Management Schedule</b>	<b>15</b>
<b>Storm Water General Permit</b>	<b>16</b>
<b>Davis Bacon Requirements</b>	<b>17</b>
<b>Wage Rate Requirements under FY 2013 Appropriations</b>	<b>18</b>

## SRF SPECIAL PROVISIONS

- (a) Line crossings of all roads and streets shall be done in accordance with the Kentucky Transportation Cabinet requirements as may be set forth in the Special Conditions.
- (b) Construction is to be carried out so as to prevent by-passing of flows during construction unless a schedule has been approved by the State or EPA, whichever is applicable. Siltation and soil erosion must be minimized during construction. All construction projects with surface disturbance of more than 1 acre during the period of construction must have a KPDES Storm Water General Permit. The permit can be found at the following web address: <https://dep.gateway.ky.gov/eForms/default.aspx?FormID=7>.

If you have any questions regarding the completion of this form call the Surface Water Permits Branch at (502) 564-3410.

- (c) Restore disturbed areas to original or better condition.
- (d) **Use of Chemicals:** All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either DOW or EPA. Use of all such chemicals and disposal of residues shall be in conformance with instructions on the manufacturer's label.
- (e) The construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of state, territorial, and local laws and ordinances to the extent that such requirements do not conflict with Federal laws and this subchapter.
- (f) The owner shall provide and maintain competent and adequate supervision and inspection.
- (g) The Kentucky Infrastructure Authority and Kentucky Division of Water shall have access to the site and the project work at all times.
- (h) In the event Archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of this project, work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.
- (i) This procurement will be subject to DOW Procurement Guidance including the Davis-Bacon Act.
- (j) Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
- (k) No wastewater bypassing will occur during construction unless a schedule has been approved by the Kentucky Division of Water.
- (l) Change orders to the construction contract (if required) must be negotiated pursuant to DOW/KIA Procurement Guidance for Construction and Equipment Contracts.

**TITLE 40--PROTECTION OF ENVIRONMENT  
CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY**

**PART 31--UNIFORM ADMINISTRATIVE REQUIREMENTS FOR GRANTS AND  
COOPERATIVE AGREEMENTS TO STATE AND LOCAL GOVERNMENTS**

**Subpart C--Post-Award Requirements**

**Sec. 31.36 Procurement.**

(a) States. When procuring property and services under a grant, a State will follow the same policies and procedures it uses for procurements from its non-Federal funds. The State will ensure that every purchase order or other contract includes any clauses required by Federal statutes and executive orders and their implementing regulations. Other grantees and sub-grantees will follow paragraphs (b) through (i) in this section.

(b) Procurement standards. (1) Grantees and sub-grantees will use their own procurement procedures which reflect applicable State and local laws and regulations, provided that the procurements conform to applicable federal law, the standards identified in this section, and if applicable, Sec. 31.38.

(2) Grantees and sub-grantees will maintain a contract administration system which ensures that contractors perform in accordance with the terms, conditions, and specifications of their contracts or purchase orders.

(3) Grantees and sub-grantees will maintain a written code of standards of conduct governing the performance of their employees engaged in the award and administration of contracts. No employee, officer or agent of the grantee or sub-grantee shall participate in selection, or in the award or administration of a contract supported by Federal funds if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when:

(i) The employee, officer or agent,

(ii) Any member of his immediate family,

(iii) His or her partner, or

(iv) An organization which employs, or is about to employ, any of the above, has a financial or other interest in the firm selected for award. The grantee's or sub-grantee's officers, employees or agents will neither solicit nor accept gratuities, favors or anything of monetary value from contractors, potential contractors, or parties to sub-agreements. Grantee and sub-grantees may set minimum rules where the financial interest is not substantial or the gift is an unsolicited item of nominal intrinsic value. To the extent permitted by State or local law or regulations, such standards or conduct will provide for penalties, sanctions, or other disciplinary actions for violations of such standards by the grantee's and sub-grantee's officers, employees, or agents, or by contractors or their agents. The awarding agency may in regulation provide additional prohibitions relative to real, apparent, or potential conflicts of interest.

(4) Grantee and sub-grantee procedures will provide for a review of proposed procurements to avoid purchase of unnecessary or duplicative items. Consideration should be given to consolidating or breaking out procurements to obtain a more economical purchase. Where appropriate, an analysis will be made of lease versus purchase alternatives, and any other appropriate analysis to determine the most economical approach.

(5) To foster greater economy and efficiency, grantees and sub-grantees are encouraged to enter into State and local intergovernmental agreements for procurement or use of common goods and services.

(6) Grantees and sub-grantees are encouraged to use Federal excess and surplus property in lieu of purchasing new equipment and property whenever such use is feasible and reduces project costs.

(7) Grantees and sub-grantees are encouraged to use value engineering clauses in contracts for construction projects of sufficient size to offer reasonable opportunities for cost reductions. Value engineering is a systematic and creative analysis of each contract item or task to ensure that its essential function is provided at the overall lower cost.

(8) Grantees and sub-grantees will make awards only to responsible contractors possessing the ability to perform successfully under the terms and conditions of a proposed procurement. Consideration will be given to such matters as contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

(9) Grantees and sub-grantees will maintain records sufficient to detail the significant history of procurement. These records will include, but are not necessarily limited to the following: rationale for the method of procurement, selection of contract type, contractor selection or rejection, and the basis for the contract price.

(10) Grantees and sub-grantees will use time and material type contracts only--

(i) After a determination that no other contract is suitable, and

(ii) If the contract includes a ceiling price that the contractor exceeds at its own risk.

(11) Grantees and sub-grantees alone will be responsible, in accordance with good administrative practice and sound business judgment, for the settlement of all contractual and administrative issues arising out of procurements. These issues include, but are not limited to source evaluation, protests, disputes, and claims. These standards do not relieve the grantee or sub-grantee of any contractual responsibilities under its contracts. Federal agencies will not substitute their judgment for that of the grantee or sub-grantee unless the matter is primarily a Federal concern. Violations of law will be referred to the local, State, or Federal authority having proper jurisdiction.

(12) Grantees and sub-grantees will have protest procedures to handle and resolve disputes relating to their procurements and shall in all instances disclose information regarding the protest to the awarding agency. A protestor must exhaust all administrative remedies with the grantee and sub-grantee before pursuing a protest with the Federal agency. Reviews of protests by the Federal agency will be limited to:

(i) Violations of Federal law or regulations and the standards of this section (violations of State or local law will be under the jurisdiction of State or local authorities) and

(ii) Violations of the grantee's or sub-grantee's protest procedures for failure to review a complaint or protest. Protests received by the Federal agency other than those specified above will be referred to the grantee or sub-grantee.

(c) Competition. (1) All procurement transactions will be conducted in a manner providing full and open competition consistent with the standards of Sec. 31.36. Some of the situations considered to be restrictive of competition include but are not limited to:

(i) Placing unreasonable requirements on firms in order for them to qualify to do business,

(ii) Requiring unnecessary experience and excessive bonding,

(iii) Noncompetitive pricing practices between firms or between affiliated companies,

(iv) Noncompetitive awards to consultants that are on retainer contracts,

(v) Organizational conflicts of interest,

(vi) Specifying only a "brand name" product instead of allowing "an equal" product to be offered and describing the performance of other relevant requirements of the procurement, and

(vii) Any arbitrary action in the procurement process.

(2) Grantees and sub-grantees will conduct procurements in a manner that prohibits the use of statutorily or administratively imposed in-State or local geographical preferences in the evaluation of bids or proposals, except in those cases where applicable Federal statutes expressly mandate or encourage geographic preference. Nothing in this section preempts State licensing laws. When contracting for architectural and engineering (A/E) services, geographic location may be a selection criteria provided its application leaves an appropriate number of qualified firms, given the nature and size of the project, to compete for the contract.

(3) Grantees will have written selection procedures for procurement transactions. These procedures will ensure that all solicitations:

(i) Incorporate a clear and accurate description of the technical requirements for the material, product, or service to be procured. Such description shall not, in competitive procurements, contain features, which unduly restrict competition. The description may include a statement of the qualitative nature of the material, product or service to be procured, and when necessary, shall set forth those minimum essential characteristics and standards to which it must conform if it is to satisfy its intended use. Detailed product specifications should be avoided if at all possible. When it is impractical or uneconomical to make a clear and accurate description of the technical requirements, a "brand name or equal" description may be used

as a means to define the performance or other salient requirements of a procurement. The specific features of the named brand which must be met by offerers shall be clearly stated; and

(ii) Identify all requirements which the offerers must fulfill and all other factors to be used in evaluating bids or proposals.

(4) Grantees and sub-grantees will ensure that all pre-qualified lists of persons, firms, or products which are used in acquiring goods and services are current and include enough qualified sources to ensure maximum open and free competition. Also, grantees and sub-grantees will not preclude potential bidders from qualifying during the solicitation period.

(5) Construction grants awarded under Title II of the Clean Water Act are subject to the following "Buy American" requirements in paragraphs (c)(5) (i)-(iii) of this section. Section 215 of the Clean Water Act requires that contractors give preference to the use of domestic material in the construction of EPA-funded treatment works.

(i) Contractors must use domestic construction materials in preference to nondomestic material if it is priced no more than 6 percent higher than the bid or offered price of the nondomestic material, including all costs of delivery to the construction site and any applicable duty, whether or not assessed. The grantee will normally base the computations on prices and costs in effect on the date of opening bids or proposals.

(ii) The award official may waive the Buy American provision based on factors the award official considers relevant, including:

(A) Such use is not in the public interest;

(B) The cost is unreasonable;

(C) The Agency's available resources are not sufficient to implement the provision, subject to the Deputy Administrator's concurrence;

(D) The articles, materials or supplies of the class or kind to be used or the articles, materials or supplies from which they are manufactured are not mined, produced or manufactured in the United States in sufficient and reasonably available commercial quantities or satisfactory quality for the particular project; or

(E) Application of this provision is contrary to multilateral government procurement agreements, subject to the Deputy Administrator's concurrence.

(iii) All bidding documents, subagreements, and, if appropriate, requests for proposals must contain the following "Buy American" provision: In accordance with section 215 of the Clean Water Act (33 U.S.C. 1251 et seq.) and implementing EPA regulations, the contractor agrees that preference will be given to domestic construction materials by the contractor, subcontractors, materialmen and suppliers in the performance of this subagreement.

(d) Methods of procurement to be followed--(1) Procurement by small purchase procedures. Small purchase procedures are those relatively simple and informal procurement methods for securing services, supplies, or other properties that do not cost more than the simplified acquisition threshold fixed at 41 U.S.C. 403(11) (currently set at \$100,000). If small purchase procedures are used, price or rate quotations shall be obtained from an adequate number of qualified sources.

(2) Procurement by sealed bids (formal advertising). Bids are publicly solicited and a firm-fixed-price contract (lump sum or unit price) is awarded to the responsible bidder whose bid, conforming with all the material terms and conditions of the invitation for bids, is the lowest in price. The sealed bid method is the preferred method for procuring construction, if the conditions in 31.36(d)(2)(i) apply.

(i) In order for sealed bidding to be feasible, the following conditions should be present:

(A) A complete, adequate, and realistic specification or purchase description is available;

(B) Two or more responsible bidders are willing and able to compete effectively and for the business; and

(C) The procurement lends itself to a firm fixed price contract and the selection of the successful bidder can be made principally on the basis of price.

(ii) If sealed bids are used, the following requirements apply:

(A) The invitation for bids will be publicly advertised and bids shall be solicited from an adequate number of known suppliers, providing them sufficient time prior to the date set for opening the bids;

(B) The invitation for bids, which will include any specifications and pertinent attachments, shall define the items or services in order for the bidder to properly respond;

(C) All bids will be publicly opened at the time and place prescribed in the invitation for bids;



(D) A firm fixed-price contract award will be made in writing to the lowest responsive and responsible bidder. Where specified in bidding documents, factors such as discounts, transportation cost, and life cycle costs shall be considered in determining which bid is lowest. Payment discounts will only be used to determine the low bid when prior experience indicates that such discounts are usually taken advantage of; and

(E) Any or all bids may be rejected if there is a sound documented reason.

(3) Procurement by competitive proposals. The technique of competitive proposals is normally conducted with more than one source submitting an offer, and either a fixed-price or cost-reimbursement type contract is awarded. It is generally used when conditions are not appropriate for the use of sealed bids. If this method is used, the following requirements apply:

(i) Requests for proposals will be publicized and identify all evaluation factors and their relative importance. Any response to publicized requests for proposals shall be honored to the maximum extent practical;

(ii) Proposals will be solicited from an adequate number of qualified sources;

(iii) Grantees and sub-grantees will have a method for conducting technical evaluations of the proposals received and for selecting awardees;

(iv) Awards will be made to the responsible firm whose proposal is most advantageous to the program, with price and other factors considered; and

(v) Grantees and sub-grantees may use competitive proposal procedures for qualifications-based procurement of architectural/engineering (A/E) professional services whereby competitors' qualifications are evaluated and the most qualified competitor is selected, subject to negotiation of fair and reasonable compensation. The method, where price is not used as a selection factor, can only be used in procurement of A/E professional services. It cannot be used to purchase other types of services though A/E firms are a potential source to perform the proposed effort.

(4) Procurement by noncompetitive proposals is procurement through solicitation of a proposal from only one source, or after solicitation of a number of sources, competition is determined inadequate.

(i) Procurement by noncompetitive proposals may be used only when the award of a contract is infeasible under small purchase procedures, sealed bids or competitive proposals and one of the following circumstances applies:

(A) The item is available only from a single source;

(B) The public exigency or emergency for the requirement will not permit a delay resulting from competitive solicitation;

(C) The awarding agency authorizes noncompetitive proposals; or

(D) After solicitation of a number of sources, competition is determined inadequate.

(ii) Cost analysis, i.e., verifying the proposed cost data, the projections of the data, and the evaluation of the specific elements of costs and profits, is required.

(iii) Grantees and sub-grantees may be required to submit the proposed procurement to the awarding agency for pre-award review in accordance with paragraph (g) of this section.

(e) Contracting with small and minority firms, women's business enterprise and labor surplus area firms.

(1) The grantee and sub-grantee will take all necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used when possible.

(2) Affirmative steps shall include:

(i) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(ii) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

(iii) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business, and women's business enterprises;

(iv) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women's business enterprises;

(v) Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce; and

(vi) Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in paragraphs (e)(2) (i) through (v) of this section.

(f) Contract cost and price.

(1) Grantees and sub-grantees must perform a cost or price analysis in connection with every procurement action including contract modifications. The method and degree of analysis is dependent on the facts surrounding the particular procurement situation, but as a starting point, grantees must make independent estimates before receiving bids or proposals. A cost analysis must be performed when the offerer is required to submit the elements of his estimated cost, e.g., under professional, consulting, and architectural engineering services contracts. A cost analysis will be necessary when adequate price competition is lacking, and for sole source procurements, including contract modifications or change orders, unless price reasonableness can be established on the basis of a catalog or market price of a commercial product sold in substantial quantities to the general public or based on prices set by law or regulation. A price analysis will be used in all other instances to determine the reasonableness of the proposed contract price.

(2) Grantees and sub-grantees will negotiate profit as a separate element of the price for each contract in which there is no price competition and in all cases where cost analysis is performed. To establish a fair and reasonable profit, consideration will be given to the complexity of the work to be performed, the risk borne by the contractor, the contractor's investment, the amount of subcontracting, the quality of its record of past performance, and industry profit rates in the surrounding geographical area for similar work.

(3) Costs or prices based on estimated costs for contracts under grants will be allowable only to the extent that costs incurred or cost estimates included in negotiated prices are consistent with Federal cost principles (see Sec. 31.22). Grantees may reference their own cost principles that comply with the applicable Federal cost principles.

(4) The cost plus a percentage of cost and percentage of construction cost methods of contracting shall not be used.

(g) Awarding agency review.

(1) Grantees and sub-grantees must make available, upon request of the awarding agency, technical specifications on proposed procurements where the awarding agency believes such review is needed to ensure that the item and/or service specified is the one being proposed for purchase. This review generally will take place prior to the time the specification is incorporated into a solicitation document. However, if the grantee or sub-grantee desires to have the review accomplished after a solicitation has been developed, the awarding agency may still review the specifications, with such review usually limited to the technical aspects of the proposed purchase.

(2) Grantees and sub-grantees must on request make available for awarding agency pre-award review procurement documents, such as requests for proposals or invitations for bids, independent cost estimates, etc. when:

(i) A grantee's or sub-grantee's procurement procedures or operation fails to comply with the procurement standards in this section; or

(ii) The procurement is expected to exceed the simplified acquisition threshold and is to be awarded without competition or only one bid or offer is received in response to a solicitation; or

(iii) The procurement, which is expected to exceed the simplified acquisition threshold, specifies a "brand name" product; or

(iv) The proposed award is more than the simplified acquisition threshold and is to be awarded to other than the apparent low bidder under a sealed bid procurement; or

(v) A proposed contract modification changes the scope of a contract or increases the contract amount by more than the simplified acquisition threshold.

(3) A grantee or sub-grantee will be exempt from the pre-award review in paragraph (g)(2) of this section if the awarding agency determines that its procurement systems comply with the standards of this section.

(i) A grantee or sub-grantee may request that its procurement system be reviewed by the awarding agency to determine whether its system meets these standards in order for its system to be certified. Generally, these reviews shall occur where there is a continuous high-dollar funding, and third-party contracts are awarded on a regular basis.

(ii) A grantee or sub-grantee may self-certify its procurement system. Such self-certification shall not limit the awarding agency's right to survey the system. Under a self-certification procedure, awarding agencies may wish to rely on written assurances from the grantee or sub-grantee that it is complying with

these standards. A grantee or sub-grantee will cite specific procedures, regulations, standards, etc., as being in compliance with these requirements and have its system available for review.

(h) Bonding requirements. For construction or facility improvement contracts or subcontracts exceeding the simplified acquisition threshold, the awarding agency may accept the bonding policy and requirements of the grantee or sub-grantee provided the awarding agency has made a determination that the awarding agency's interest is adequately protected. If such a determination has not been made, the minimum requirements shall be as follows:

(1) A minimum bid guarantee from each bidder equivalent to five percent of the bid price. The "bid guarantee" shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of his bid, execute such contractual documents as may be required within the time specified.

(2) A performance bond on the part of the contractor for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract.

(3) A payment bond on the part of the contractor for 100 percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

(i) Contract provisions. A grantee's and sub-grantee's contracts must contain provisions in paragraph (i) of this section. Federal agencies are permitted to require changes, remedies, changed conditions, access and records retention, suspension of work, and other clauses approved by the Office of Federal Procurement Policy.

(1) Administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as may be appropriate. (Contracts more than the simplified acquisition threshold)

(2) Termination for cause and for convenience by the grantee or sub-grantee including the manner by which it will be effected and the basis for settlement. (All contracts in excess of \$10,000)

(3) Compliance with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR chapter 60). (All construction contracts awarded in excess of \$10,000 by grantees and their contractors or sub-grantees)

(4) Compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR part 3). (All contracts and sub-grants for construction or repair)

(5) Compliance with the Davis-Bacon Act (40 U.S.C. 276a to 276a-7) as supplemented by Department of Labor regulations (29 CFR part 5). (Construction contracts in excess of \$2000 awarded by grantees and sub-grantees when required by Federal grant program legislation)

(6) Compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor regulations (29 CFR part 5). (Construction contracts awarded by grantees and sub-grantees in excess of \$2000, and in excess of \$2500 for other contracts which involve the employment of mechanics or laborers)

(7) Notice of awarding agency requirements and regulations pertaining to reporting.

(8) Notice of awarding agency requirements and regulations pertaining to patent rights with respect to any discovery or invention which arises or is developed in the course of or under such contract.

(9) Awarding agency requirements and regulations pertaining to copyrights and rights in data.

(10) Access by the grantee, the sub-grantee, the Federal grantor agency, the Comptroller General of the United States, or any of their duly authorized representatives to any books, documents, papers, and records of the contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions.

(11) Retention of all required records for three years after grantees or sub-grantees make final payments and all other pending matters are closed.

(12) Compliance with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15). (Contracts, subcontracts, and sub-grants of amounts in excess of \$100,000)

(13) Mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871).

(j) Payment to consultants.

(1) EPA will limit its participation in the salary rate (excluding overhead) paid to individual consultants retained by grantees or by a grantee's contractors or subcontractors to the maximum daily rate for a GS-18. (Grantees may, however, pay consultants more than this amount). This limitation applies to consultation services of designated individuals with specialized skills who are paid at a daily or hourly rate. This rate does not include transportation and subsistence costs for travel performed; grantees will pay these in accordance with their normal travel reimbursement practices. (Pub. L. 99-591).

(2) Sub-agreements with firms for services which are awarded using the procurement requirements in this part are not affected by this limitation.

(k) Use of the same architect or engineer during construction.

(1) If the grantee is satisfied with the qualifications and performance of the architect or engineer who provided any or all of the facilities planning or design services for a waste-water treatment works project and wishes to retain that firm or individual during construction of the project, it may do so without further public notice and evaluation of qualifications, provided:

(i) The grantee received a facilities planning (Step 1) or design grant (Step 2), and selected the architect or engineer in accordance with EPA's procurement regulations in effect when EPA awarded the grant; or  
(ii) The award official approves noncompetitive procurement under Sec. 31.36(d)(4) for reasons other than simply using the same individual or firm that provided facilities planning or design services for the project; or

(iii) The grantee attests that:

(A) The initial request for proposals clearly stated the possibility that the firm or individual selected could be awarded a sub-agreement for services during construction; and

(B) The firm or individual was selected for facilities planning or design services in accordance with procedures specified in this section.

(C) No employee, officer or agent of the grantee, any member of their immediate families, or their partners have financial or other interest in the firm selected for award; and

(D) None of the grantee's officers, employees or agents solicited or accepted gratuities, favors or anything of monetary value from contractors or other parties to sub-agreements.

(2) However, if the grantee uses the procedures in paragraph (k)(1) of this section to retain an architect or engineer, any Step 3 sub-agreements between the architect or engineer and the grantee must meet all of the other procurement provisions in Sec. 31.36.

[53 FR 8068 and 8087, Mar. 11, 1988, and amended at 53 FR 8075, Mar. 11, 1988; 60 FR 19639, 19644, Apr. 19, 1995; 66 FR 3794, Jan. 16, 2001]

**KRS Chapter 45A**  
**Kentucky Model Procurement Code**

**45A.075 Methods of awarding state contracts.**

Except as otherwise authorized by law, all state contracts shall be awarded by:

- (1) Competitive sealed bidding, pursuant to KRS 45A.080; or
- (2) Competitive negotiation, pursuant to KRS 45A.085 and 45A.090 or 45A.180; or
- (3) Noncompetitive negotiation, pursuant to KRS 45A.095; or
- (4) Small purchase procedures, pursuant to KRS 45A.100.

**Effective:** June 24, 2003

**History:** Amended 2003 Ky. Acts ch. 98, sec. 4, effective June 24, 2003. -- Created 1978 Ky. Acts ch. 110, sec. 16, effective January 1, 1979.

**45A.080 Competitive sealed bidding.**

(1) Contracts exceeding the amount provided by KRS 45A.100 shall be awarded by competitive sealed bidding unless it is determined in writing that this method is not practicable. Factors to be considered in determining whether competitive sealed bidding is not practicable shall include:

- (a) Whether specifications can be prepared that permit award on the basis of best value; and
- (b) The available sources, the time and place of performance, and other relevant circumstances as are appropriate for the use of competitive sealed bidding.

(2) The invitation for bids shall state that awards shall be made on the basis of best value. In any contract which is awarded under an invitation to bid which requires delivery by a specified date and imposes a penalty for late delivery, if the delivery is late, the contractor shall be given the opportunity to present evidence that the cause of the delay was beyond his control. If it is the opinion of the purchasing officer that there is sufficient justification for delayed delivery, the purchasing officer may adjust or waive any penalty that is provided for in the contract.

(3) Adequate public notice of the invitation for bids shall be given a sufficient time prior to the date set forth for the opening of bids. The notice may include posting on the Internet or publication in a newspaper or newspapers of general circulation in the state as determined by the secretary of the Finance and Administration Cabinet not less than seven (7) days before the date set for the opening of the bids. The provisions of this subsection shall also apply to price contracts and purchase contracts of state institutions of higher education.

(4) Bids shall be opened publicly at the time and place designated in the invitation for bids. At the time the bids are opened, the purchasing agency shall announce the agency's engineer's estimate, if applicable, and make it a part of the agency records pertaining to the letting of any contract for which bids were received. Each bid, together with the name of the bidder and the agency's engineer's estimate, shall be recorded and be open to public inspection. Electronic bid opening and posting of the required information for public viewing shall satisfy the requirements of this subsection.

(5) The contract shall be awarded by written notice to the responsive and responsible bidder whose bid offers the best value.

(6) Correction or withdrawal of bids shall be allowed only to the extent permitted by regulations issued by the secretary.

**Effective:** July 14, 2000

**History:** Amended 2000 Ky. Acts ch. 509, sec. 1, effective July 14, 2000. -- Amended 1998 Ky. Acts ch. 120, sec. 10, effective July 15, 1998. -- Amended 1997 (1<sup>st</sup> Extra. Sess.) Ky. Acts ch. 4, sec. 27, effective May 30, 1997. -- Amended 1996 Ky. Acts ch. 60, sec. 2, effective July 15, 1996. -- Amended 1994 Ky. Acts ch. 278, sec. 1, effective July 15, 1994. -- Amended 1982 Ky. Acts ch. 282, sec. 1, effective July 15, 1982. -- Amended 1979 (1<sup>st</sup> Extra.

**45A.085 Competitive negotiation.**

(1) When, under administrative regulations promulgated by the secretary or under KRS 45A.180, the purchasing officer determines in writing that the use of competitive sealed bidding is not practicable, and except as provided in KRS 45A.095 and 45A.100, a contract may be awarded by competitive negotiation.

(2) Adequate public notice of the request for proposals shall be given in the same manner and circumstances as provided in KRS 45A.080(3).

(3) Contracts other than contracts for projects utilizing an alternative project delivery method under KRS 45A.180 may be competitively negotiated when it is determined in writing by the purchasing officer that the bids received by competitive sealed bidding either are unreasonable as to all or part of the requirements, or were not independently reached in open competition, and for which each competitive bidder has been notified of the intention to negotiate and is given reasonable opportunity to negotiate.

(4) Contracts for projects utilizing an alternative project delivery method shall be processed in accordance with KRS 45A.180.

(5) The request for proposals shall indicate the relative importance of price and other evaluation factors.

(6) Award shall be made to the responsible offerer whose proposal is determined in writing to be the most advantageous to the Commonwealth, taking into consideration price and the evaluation factors set forth in the request for proposals.

(7) Written or oral discussions shall be conducted with all responsible offerers who submit proposals determined in writing to be reasonably susceptible of being selected for award. Discussions shall not disclose any information derived from proposals submitted by competing offerers. Discussions need not be conducted:

(a) With respect to prices, where the prices are fixed by law or administrative regulation, except that consideration shall be given to competitive terms and conditions;

(b) Where time of delivery or performance will not permit discussions; or

(c) Where it can be clearly demonstrated and documented from the existence of adequate competition or prior experience with the particular supply, service, or construction item, that acceptance of an initial offer without discussion would result in fair and reasonable best value procurement, and the request for proposals notifies all offerers of the possibility that award may be made on the basis of the initial offers.

**Effective:** June 24, 2003

**History:** Amended 2003 Ky. Acts ch. 98, sec. 5, effective June 24, 2003. – Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 28, effective May 30, 1997. – Amended 1979 (1st Extra. Sess.) Ky. Acts ch. 9, sec. 2, effective February 10, 1979. -- Created 1978 Ky. Acts ch. 110, sec. 18, effective January 1, 1979.

**45A.090 Negotiation after competitive sealed bidding when all bids exceed available funds.**

(1) In the event that all bids submitted pursuant to competitive sealed bidding under KRS 45A.080 result in bid prices in excess of the funds available for the purchase, and the chief purchasing officer determines in writing:

(a) That there are no additional funds available from any source so as to permit an award to the responsive and responsible bidder whose bid offers the best value; and

(b) The best interest of the state will not permit the delay attendant to a resolicitation under revised specifications, or for revised quantities, under competitive sealed bidding as provided in KRS 45A.080, then a negotiated award may be made as set forth in subsections (2) or (3) of this section.

(2) Where there is more than one (1) bidder, competitive negotiations pursuant to KRS 45A.085(3) shall be conducted with the three (3) (two (2) if there are only two (2)) bidders determined in writing to be the most responsive and responsible bidders, based on criteria contained in the bid invitation. Such competitive negotiations shall be conducted under the following restrictions:

(a) If discussions pertaining to the revision of the specifications or quantities are held with any potential offerer, all other potential offerers shall be afforded an opportunity to take part in such discussions; and

(b) A request for proposals, based upon revised specifications or quantities, shall be issued as promptly as possible, shall provide for an expeditious response to the revised requirements, and shall be awarded upon the basis of best value.

(3) Where, after competitive sealed bidding, it is determined in writing that there is only one (1) responsive and responsible bidder, a noncompetitive negotiated award may be made with such bidder in accordance with KRS 45A.095.

**Effective:** June 24, 2003

**History:** Amended 2003 Ky. Acts ch. 98, sec. 6, effective June 24, 2003. – Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 29, effective May 30, 1997. – Created 1978 Ky. Acts ch. 110, sec. 19, effective January 1, 1979.

#### **45A.095 Noncompetitive negotiation.**

(1) A contract may be made by noncompetitive negotiation only for sole source purchases, or when competition is not feasible, as determined by the purchasing officer in writing prior to award, under administrative regulations promulgated by the secretary of the Finance and Administration Cabinet or the governing boards of universities operating under KRS Chapter 164A, or when emergency conditions exist. Sole source is a situation in which there is only one (1) known capable supplier of a commodity or service, occasioned by the unique nature of the requirement, the supplier, or market conditions. Insofar as it is practical, no less than three (3) suppliers shall be solicited to submit written or oral quotations whenever it is determined that competitive sealed bidding is not feasible. Award shall be made to the supplier offering the best value. The names of the suppliers submitting quotations and the date and amount of each quotation shall be placed in the procurement file and maintained as a public record. Competitive bids may not be required:

(a) For contractual services where no competition exists, such as telephone service, electrical energy, and other public utility services;

(b) Where rates are fixed by law or ordinance;

(c) For library books;

(d) For commercial items that are purchased for resale;

(e) For interests in real property;

(f) For visiting speakers, professors, expert witnesses, and performing artists;

(g) For personal service contracts executed pursuant to KRS 45A.690 to 45A.725; and

(h) For agricultural products in accordance with KRS 45A.645.

(2) The chief procurement officer, the head of a using agency, or a person authorized in writing as the designee of either officer may make or authorize others to make emergency procurements when an emergency condition exists.

(3) An emergency condition is a situation which creates a threat or impending threat to public health, welfare, or safety such as may arise by reason of fires, floods, tornadoes, other natural or man-caused disasters, epidemics, riots, enemy attack, sabotage, explosion, power failure, energy shortages, transportation emergencies, equipment failures, state or federal legislative mandates, or similar events. The existence of the emergency condition creates an immediate and serious need for services, construction, or items of tangible personal property that cannot be met through

normal procurement methods and the lack of which would seriously threaten the functioning of government, the preservation or protection of property, or the health or safety of any person.

(4) The Finance and Administration Cabinet may negotiate directly for the purchase of contractual services, supplies, materials, or equipment in bona fide emergencies regardless of estimated costs. The existence of the emergency shall be fully explained, in writing, by the head of the agency for which the purchase is to be made. The explanation shall be approved by the secretary of the Finance and Administration Cabinet and shall include the name of the vendor receiving the contract along with any other price quotations and a written determination for selection of the vendor receiving the contract. This information shall be filed with the record of all such purchases and made available to the public. Where practical, standard specifications shall be followed in making emergency purchases. In any event, every effort should be made to effect a competitively established price for purchases made by the state.

**Effective:** July 15, 2002

**History:** Amended 2002 Ky. Acts ch. 344, sec. 9, effective July 15, 2002. – Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 30, effective May 30, 1997. – Amended 1990 Ky. Acts ch. 496, sec. 4, effective July 13, 1990. -- Created 1978 Ky. Acts ch. 110, sec. 20, effective January 1, 1979.

#### **45A.100 Small purchases.**

(1) Procurements may be made in accordance with small purchase administrative regulations promulgated by the secretary of the Finance and Administration Cabinet, pursuant to KRS Chapter 13A, as follows:

(a) Up to ten thousand dollars (\$10,000) per project for construction and one thousand dollars (\$1,000) for purchases by any state governmental body, except for those state administrative bodies specified in paragraph (b) of this subsection; and

(b) Up to forty thousand dollars (\$40,000) per project for construction or purchases by the Finance and Administration Cabinet, state institutions of higher education, and the legislative branch of government.

(2) Procurement requirements shall not be artificially divided so as to constitute a small purchase under this section. At least every two (2) years, the secretary shall review the prevailing costs of labor and materials and may make recommendations to the next regular session of the General Assembly for the revision of the then current maximum small purchase amount as justified by intervening changes in the cost of labor and materials.

(3) The secretary of the Finance and Administration Cabinet may grant to any state agency with a justifiable need a delegation of small purchasing authority, which exceeds the agency's small purchase limit, provided in subsection (1) of this section. Delegations of small purchasing authority shall be granted or revoked by the secretary of the Finance and Administration Cabinet, in accordance with administrative regulations promulgated by the cabinet pursuant to KRS Chapter 13A. These administrative regulations shall establish, at a minimum, the criteria for granting and revoking delegations of small purchasing authority, including the requesting agency's past compliance with purchasing regulations, the level of training of the agency's purchasing staff, and the extent to which the agency utilizes the Kentucky Automated Purchasing System. The administrative regulations may permit the secretary of the Finance and Administration Cabinet to delegate small purchase procurements up to the maximum amount specified in subsection (1)(b) of this section.

**Effective:** July 15, 2002

**History:** Amended 2002 Ky. Acts ch. 320, sec. 2, effective July 15, 2002. – Amended 2000 Ky. Acts ch. 225, sec. 1, effective July 14, 2000. -- Amended 1996 Ky. Acts ch. 60, sec. 1, effective July 15, 1996. -- Amended 1994 Ky. Acts ch. 323, sec. 1, effective July 15, 1994. -- Amended 1990 Ky. Acts ch. 496, sec. 5, effective July 13, 1990. -- Amended 1986 Ky. Acts ch. 384, sec. 1, effective July 15, 1986. -- Amended 1984 Ky. Acts ch. 384, sec. 1, effective July 13, 1984. -- Amended 1982 Ky. Acts ch. 282, sec. 2, effective July 15, 1982. -- Amended 1980 Ky. Acts ch. 242, sec. 1, effective July 15, 1980; and ch. 250, sec. 19, effective April 9, 1980.-- Created 1978 Ky. Acts ch. 110, sec. 21, effective January 1, 1979.





**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE  
EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)**

The following excerpts are from 45 FR 65984 (October 3, 1980):

The minority and female goals apply to Federal and federally assisted construction contractors and subcontractors which have covered contracts. The goals are expressed as a percentage of the total hours worked by such a covered or subcontractor's entire onsite construction workforce, which is working on any construction site within a relevant area. The goal applies to each construction craft and trade in the contractor's entire workforce in the relevant area including those employees working on private non-federally involved projects.

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or federally assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographic area. The goals are applicable to each nonexempt contractor's total onsite construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, federally assisted or non-federally related project, contract or subcontract.

Construction contractors which are participating in an approved Hometown Plan (see 41 CFR 60-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply as follows:

- Goals for female participation in each trade.....6.9%
- Goals for minority participation in each trade.....Insert goals for each year  
(see Attachment Number 6)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area.

The following excerpts are from 45 FR 65977 (October 3, 1980):

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the covered area is (insert description of the geographical areas where the contract is to be performed giving the state, country, and city, if any).

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION  
CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)**

EEO Specifications

Following is the standard language, which must be incorporated into all solicitations for offers and bids on all Federal and Federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in designated geographical areas:

1. As used in these specifications:
  - (a) Covered Area means the geographical area described in the solicitation from which this contract resulted.
  - (b) Director means Director, Office of Federal Contract Compliance Program, United States Department of Labor, or any person to whom the Director delegates authority;
  - (c) Employer identification number means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
  - (d) Minority includes:
    - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
    - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
    - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
    - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take a good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7-a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative actions steps at least as extensively as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligation.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7-b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, lay-off, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative actions obligations (7 a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7 a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example: even though the Contractor has achieved its goal for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables for affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local

or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

**EEO Goals for Economic Areas in Region 4**

Source: Appendix B-80 in 45 FR 65984 (October 3, 1980)

**Kentucky:**

056 Paducah, KY:	
Non-SMSA Counties	5.2
IL Hardin; IL Massac; IL Pope; KY Ballard; KY Caldwell; KY Calloway. KY Carlisle; KY Crittenden; KY Fulton; KY Graves; KY Hickman; KY Livingston; KY Lyon. KY McCracken; KY Marshall.	
057 Louisville, KY:	
SMSA Counties:	
4520 Louisville, KY-IN	11.2
IN Clark; IN Floyd; KY Bullitt; KY Jefferson; KY Oldham.	
Non-SMSA Counties	9.6
IN Crawford; IN Harrison; IN Jefferson; IN Orange; IN Scott; IN Washington; KY Breckinridge; KY Grayson; KY Hardin; KY Hart; KY Henry; KY Larue; KY Marion; KY Meade; KY Nelson; KY Shelby; KY Spencer; KY Trimble; KY Washington.	
058 Lexington, KY	
SMSA Counties	
4280 Lexington-Fayette, KY	10.8
KY Bourbon; KY Clark; KY Fayette; KY Jessamine; KY Scott; KY Woodford.	
Non-SMSA Counties	7.0
KY Adair KY Anderson; KY Bath; KY Boyle; KY Breathitt; KY Casey; KY Clay; KY Estill; KY Franklin- KY Garrard; KY Green; KY Harrison- KY Jackson; KY Knott; KY Lee; KY Leslie; KY Letcher; KY Lincoln; KY Madison; KY Magoffin; KY Menifee; KY Mercer; KY Montgomery; KY Morgan. KY Nicholas; KY Owsley; KY Perry; KY Powell; KY Pulaski; KY Rockcastle; KY Russell; KY Taylor; KY Wolfe.	



**CHECK LIST OF EEO DOCUMENTATION FOR BIDDERS  
ON GRANT/LOAN CONSTRUCTION  
(Required by Executive Order 11246 as amended)**

The low, responsive responsible bidder must forward the following items, in duplicate, to the owner no later than ten (10) days after bid opening. The owner shall have one (1) copy available for inspection by the Office of Federal Contracts Compliance within 14 days after the bid opening. The web site for the OFCC is <http://www.dol.gov/esa/ofcp.org.htm>.

1. Project Number. Project Location. Type of Construction.
2. Proof of registration with the Joint Reporting Commission. (See Attachment Number 8.)
3. Copy of Affirmative Action Plan of contractor. Indicate company official responsible for EEO.
4. List of current construction contracts, with dollar amount. List contracting Federal Agency, if applicable.
5. Statistics concerning company percent workforce, permanent and temporary, by sex, race, trade, handicapped, and age. 40 CFR Part 7.
6. List of employment sources for project in question. If union sources are utilized, indicate percentage of minority membership within the union crafts.
7. Anticipated employment needs for this project, by sex, race and trade, with estimate of minority participation in specific trades.
8. List of subcontractors (name, address and telephone) with dollar amount and duration of subcontract. Subcontractor contracts over \$10,000 must submit items 1- 8. The following information must be provided for all supplier contracts regardless of contract size: name of company, contact person, address, telephone number, dollar value of the contract, and a list of the materials to be supplied to the prime contractor.
9. List of any subcontract work yet to be committed with estimate of dollar amount and duration of contract.
10. Contract Price. Duration of prime contract.
11. DBE Documents - See special instructions regarding use of Minority, and Women Owned, and Small Businesses.

## Employer Information Report EEO-1

Under the direction of the US Equal Employment Opportunity Commission, the Joint Reporting Committee is responsible for the full-length, multi-phase processing of employment statistics collected on the Employer Information Report EEO-1. This report, also termed Standard Form 100, details the sex and race/ethnic composition of an employer's work force by job category.

The Employer Information EEO-1 survey is conducted annually under the authority of Public Law 88-352, Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972. All employers with 15 or more employees are covered by Public Law 88-352 and are required to keep employment records as specified by Commission regulations. Based on the number of employees and federal contract activities, certain large employers are required to file an EEO-1 Report on an annual basis.

The EEO-1 Report must be filed by:

(A) All private employers who are: (1) subject to Title VII of the Civil Rights Act of 1964 (as amended by the Equal Employment Opportunity Act of 1972) with 100 or more employees EXCLUDING State and local governments, primary and secondary school systems, institutions of higher education, Indian tribes and tax-exempt private memberships clubs other than labor organizations; OR (2) subject to Title VII who have fewer than 100 employees if the company is owned or affiliated with another company, or there is centralized ownership, control or management (such as central control of personnel policies and labor relations) so that the group legally constitutes a single enterprise and the entire enterprise employs a total of 100 or more employees.

(B) All federal contractors (private employers), who: (1) are not exempt as provided for by 41 CFR 60-1.5, (2) have 50 or more employees, and (a) are prime contractors or first-tier subcontractors, and have a contract, subcontract, or purchase order amounting to \$50,000 or more; or (b) serve as depository of Government funds in any amount, or (c) is a financial institution which is an issuing an paying agent for U.S. Savings Bonds and Notes.

Only those establishments located in the District of Columbia and the 50 states are required to submit the EEO-1 Report. No Reports should be filed for establishments in Puerto Rico, the Virgin Islands or other American Protectorates.

When filing for the EEO-1 Report for the first time, go to the web site at: <http://www.mimdms.com/jrc.html> and select "Filing for the first time" from the box labeled INFORMATION. File out the electronic questionnaire to enter your company into Joint Reporting Committee (JRC) system. Once you have completed the registration process, you will be contacted on how to proceed with the EEO-1 Report. If you have previously registered with the JRC, follow their instructions to update your information.

**Labor Standards Provisions for Federally Assisted Construction**

Labor standards provisions applicable to contracts covering federally financed and assisted construction (29 CFR 5.5, Contract Provisions and Related Matters) that apply to EPA Special Appropriations Projects grants are:

(a)(4)(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.

(a)(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.

(a)(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 U.S. Environmental Protection Agency may by appropriate instructions require, 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.

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

(b) Contractor Work Hours and Safety Standards Act. The Administrator, EPA shall cause or require the contracting officer to insert the following clauses set forth in paragraph (b)(1),(2),(3), and (4) of this section in full in any contract 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 \*Section 5.5(a) of this title. 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 work week in which he or she is employed on such work to 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 (b) (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 unliquidated 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 (b)(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 (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The U.S. Environmental Protection Agency shall upon its own action or upon written request of an authorized representative of the Department of Labor 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 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 (b)(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 (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in section 5.1, the Administrator of EPA shall cause or require the contracting officer to 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 worked, deductions made, and actual wages paid. Further, the Administrator of EPA shall cause or require the contracting officer to 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 U.S. Environmental Protection Agency and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job. (Approved by the Office of Management and Budget under OMB control numbers 1215-0140 and 1215-0017.)

## **CERTIFICATIONS**

### **Debarred Firms**

All prime Construction Contractors shall certify that Subcontractors have not and will not be awarded to any firm that is currently on the EPA Master List of Debarred, Suspended and Voluntarily Excluded Persons in accordance with the provisions of 40 CFR 32.500(c). Debarment action is taken against a firm for noncompliance with Federal Law.

All bidders shall complete the attached certification (Attachment Number 10) and submit to the owner with the bid proposal.

### **Anti-lobbying Certification**

All prime Construction Contractors must certify (Attachment Number 11) that no appropriated funds were or will be expended for the purpose of lobbying the Executive or Legislative Branches of the Federal Government or Federal Agency concerning this contract (contract in excess of \$100,000). If the Contractor has made or agreed to make payment to influence any member of Congress in regard to award of this contract, a Disclosure Form must be completed and submitted to the owner with the bid proposal.

All prime Contractors must require all Subcontractors to submit the certification, which must also be submitted to the owner.

**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 judgment 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 (1)(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.

**CERTIFICATION REGARDING LOBBYING  
Certification for Contracts, Grants,  
Loans, and Cooperative Agreements**

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

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

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

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

\_\_\_\_\_  
Typed Name & Title of Authorized Representative

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date

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

## EPA DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

EPA's Disadvantaged Business Enterprise Program rule applies to contract procurement actions funded in part by EPA assistance agreements awarded after May 27, 2008. The rule is found at Federal regulation Title 40, Part 33. Specific responsibilities are highlighted below.

### Grant recipient responsibilities:

- Conduct an Availability Analysis and negotiate fair share objectives with EPA (§33.411), or adopt the fair share objectives of the oversight state agency revolving loan fund for comparable infrastructure. (§33.405(b)(3)).
- Include the Appendix A term and condition in each contract with a primary contractor (§3.106). The term and condition is included in the EPA Region 4 contract specifications insert *FEDERAL REQUIREMENTS AND CONTRACT PROVISIONS FOR SPECIAL APPROPRIATION ACT PROJECTS US ENVIRONMENTAL PROTECTION AGENCY, Region III, June 2008*.
- Employ the six Good Faith Efforts during prime contractor procurement (§33.301).
- Require prime contractor to comply with the following prime contractor requirements of Title 40 Part 33:
  - To employ the six Good Faith Efforts steps in paragraphs (a) through (e) of §33.301 if the prime contractor awards subcontracts (§33.301(f)).
  - To provide EPA form 6100-2 – *DBE Subcontractor Participation Form* to all DBE subcontractors (§33.302(e)).
  - To submit EPA forms 6100-3 – *DBE Program Subcontractor Performance Form* and 6100-4 – *DBE Program Subcontractor Utilization Form* with bid package or proposal. (§33.302 (f) and (g)).
  - To pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient (§33.302(a)).
  - To notify recipient in writing by its prime contractor prior to any termination of a DBE subcontractor for convenience by the prime contractor (§33.302(b)).
  - To employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§33.302(c)).
  - To employ the six good faith efforts described in §33.301 even if the prime contractor has achieved its fair share objectives under subpart D of Part 33. (§33.302(d)).



- Semiannually complete and submit to Charles Hayes, EPA Region 4 DBE Coordinator EPA form 5700-52A summarizing DBE participation achieved during the previous six months (§33.502).
- Maintain records documenting its compliance with the requirements of Title 40 Part 33, including documentation of its, and its prime contractors', good faith efforts (§33.501(a)).

**Prime Contractor Responsibilities:**

- Employ the six Good Faith Efforts steps in paragraphs (a) through (e) of §33.301 if the prime contractor awards subcontracts (§33.301(f)).
- Provide EPA form number 6100-2 – *DBE Program Subcontractor Participation Form* and form number 6100-3 – *DBE Program Subcontractor Performance Form* to each DBE subcontractor prior to opening of the contractor's bid or proposal (§33.302(e) and (f)).
- Complete EPA form number 6100-4 – *DBE Program Subcontractor Utilization Form* (§33.302(g)).
- Submit to recipient with its bid package or proposal the completed EPA form number 6100-4, plus an EPA form number 6100-3 for each DBE subcontractor used in the contractor's bid or proposal (§33.302(f) and (g)).
- Pay subcontractors for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient (§33.302(a)).
- Notify the recipient in writing prior to prime contractor termination of a DBE subcontractor for convenience (§33.302(b)).
- Employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§33.302(c)).
- Employ the six good faith efforts described in §33.301 even if the prime contractor has achieved its fair share objectives under subpart D of Part 33. (§33.302(d)).
- Semiannually inform recipient of DBE participation achieved (§33.502).
- Maintain records documenting its compliance with the requirements of Title 40 Part 33, including documentation of its, and its prime contractors', good faith efforts (§33.501(a)).

**Subcontractor Responsibilities:**

- May submit EPA form 6100-2 – *DBE Subcontractor Participation Form* to Charles Hayes, EPA Region 4 DBE Coordinator (§33.302(e)).
- Must complete EPA form 6100-3 – *DBE Program Subcontractor Performance Form*, and submit it to the prime contractor soliciting services from the subcontractor prior to the opening of bids for the prime contract.

**SPAP Requirements:**

<b>Form</b>	<b>Requirement</b>	<b>Provided By:</b>	<b>Completed By:</b>	<b>Submitted To:</b>
EPA Form 6100-2	Grant Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	EPA Region 4 DBE Coordinator Charles Hayes
EPA Form 6100-3	Grant Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	Grant Recipients as part of a bid or proposal package
EPA Form 6100-4	Grant Recipients required to have prime contractors complete the form	Grant Recipients	Prime Contractors	Grant Recipients as part of a bid or proposal package

**SRF Requirements:**

<b>Form</b>	<b>Requirement</b>	<b>Provided By:</b>	<b>Completed By:</b>	<b>Submitted To:</b>
EPA Form 6100-2	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	DOW Project Administrator
EPA Form 6100-3	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	Dow Project Administrator w/ATA Package
EPA Form 6100-4	Recipients required to have prime contractors complete the form	Recipients	Prime Contractors	DOW Project Administrator w/ATA Package
Pay Request DBE Form	Recipients required to have prime contractors complete the form	Recipients	Prime Contractors	DOW Project Administrator w/EACH PAYMENT

**DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION POLICY**

**PROJECT NAME:** \_\_\_\_\_

**BID DATE:** \_\_\_\_\_

**1. Name, address and telephone number of contact person on all DBE matters:**

Prime Contractor's Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

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

Phone: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Total Contract Amount: \_\_\_\_\_

**2. Total dollar amount/percent of contract of MBE participation:** \_\_\_\_\_

**3. Total dollar amount/percent of contract of WBE participation:** \_\_\_\_\_

**4. Are certifications\* for each MBE/WBE/DBE subcontractor enclosed; if no, please explain:**  Yes  No  
\_\_\_\_\_

**5. Are MBE/WBE/DBE subcontracts or letters of intent signed by both parties enclosed; if no, please explain:**  Yes  No  
\_\_\_\_\_

**6. List of MBE Subcontractors:**

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

Contact Person: \_\_\_\_\_

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

Phone: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Type of Contract: \_\_\_\_\_

Work to be Done: \_\_\_\_\_

Amount: \_\_\_\_\_

**7. List of WBE Subcontractors:**

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

Contact Person: \_\_\_\_\_

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

Phone: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Type of Contract: \_\_\_\_\_

Work to be Done: \_\_\_\_\_

Amount: \_\_\_\_\_

Attach Additional Sheets, If Necessary

\*Self-certification: Self certification of MBE/WBE/DBE firms will NOT be accepted as a valid form of certification of MBE/WBE/DBE status.

**8. Information and documentation concerning efforts taken to comply with EPA's "six good faith efforts"**

- (i). Ensure DBE construction firms or material suppliers are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities; including placing DBEs on solicitation lists and soliciting them whenever they are potential sources. A good source for a list of DBEs is the Kentucky Transportation's website: <http://transportation.ky.gov/Civil-Rights-and-Small-Business-Development/Pages/Certified-DBE-Directory.aspx>.
- The prime contractor certifies that a bidders list (see example sheet below) of qualified vendors, including DBEs, was developed for current and future solicitations and that the list will be maintained. *Submit a copy of the list as documentation.*
- (ii). 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; including, whenever possible, posting solicitation for bids or proposals for a sufficient amount of time as to receive a competitive bid or proposal pool.
- The prime contractor certifies that every opportunity was provided to a number of DBEs to encourage their participation in the competitive process and that an adequate amount of time was provided for response.
- a. List each DBE construction firm or material supplier to which a solicitation was attempted. *Submit copies of letters, emails, faxes, telecommunication logs, certified mail receipts, returned envelopes, certified mail return receipts, etc. as documentation.*
- Company name and phone number: \_\_\_\_\_  
Area of work expertise: \_\_\_\_\_  
Date of any follow-ups and person spoke to: \_\_\_\_\_
- b. Advertisements, if applicable: List each publication in which an announcement or notification was placed. *Submit a tear sheet of each announcement from each publication as documentation.*
- Name of publication: \_\_\_\_\_  
Date(s) of advertisement: \_\_\_\_\_  
Specific subcontract areas announced: \_\_\_\_\_
- c. Other, if applicable: List each notification method in which an announcement or outreach was used; list serve, public meeting, etc. *Submit applicable information to document effort.*
- Method of notification: \_\_\_\_\_  
Date(s) of notification: \_\_\_\_\_
- (iii). Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs; including dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
- The prime contractor certifies that the project was broken into its basic elements (i.e., dirt hauling, landscaping, painting, pipe installation, material supplies, etc.) and that a determination was made whether it's economically feasible to bid the elements separately and that the analysis of this effort was documented with a short memo to the project file.

- (iv). Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women’s business enterprises.
  - The prime contractor certifies that they established delivery schedules which would allow DBEs to participate in the projects.
- (v). Use the services and assistance of the Small Business Administration (SBA) and the Minority Business Development Agency (MBDA) of the U.S. Department of Commerce. The easiest way to utilize the services of SBA and MBDA is to visit their websites: [www.sba.gov](http://www.sba.gov) and [www.mbda.gov](http://www.mbda.gov) and use the electronic tools available there or you may send the nearest SBA and MBDA office a certified letter that generally describes the solicitation, the dates it will be open, the types of vendors you are seeking and applicable SIC or NAIC codes if known. You may also use the services and assistance of the Kentucky Procurement Assistance Program (KPAP). The easiest way to utilize the services of KPAP is to send an email: [ced.kpap@ky.gov](mailto:ced.kpap@ky.gov) and provide information on forthcoming opportunities available to DBEs.
  - The prime contractor certifies that the assistance of the SBA, MBDA, and/or KPAP was utilized. *Submit pages printed off the SBA and MBDA websites which evidence efforts to register a solicitation on those sites or submit copies of the letter sent and certified mail receipt as documentation; submit copies of emails with KPAP as documentation.*
- (vi). If a subcontractor awards any subcontracts, require the subcontractor to take the steps in numbers (i) through (v) above.
  - The prime contractor certifies that subcontractors used for this project will be required to follow the steps of the “six good faith efforts” as listed above.

**9. Signature and date:**

To the best of my knowledge and belief, all “six good faith efforts” have been met and the information contained in this document is true and correct; the document has been duly authorized by the legal representative.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print name and title

\_\_\_\_\_  
Date

# BIDDER'S LIST FORM

**OWNER:** \_\_\_\_\_

**LOAN NO:** \_\_\_\_\_

**PROJECT TITLE:** \_\_\_\_\_

**BID DATE:** \_\_\_\_\_

**Instructions:**

- 1. This list must include all firms that were solicited for participation, bid on, or quoted for a prime contract or subcontracts under EPA assisted projects, included both DBE's and non DBE's.
- 2. SRF loan participants must keep the Bidder's List until the project period for the identified loan has ended and no funds are remaining.
- 3. This list must be submitted to DOW in the ATA Package. Contract Award Approval cannot be given until this form has been received by DOW.
- 4. The following information must be obtained from all prime and subcontractors. Please complete the form below:

ENTITY'S NAME	MAILING ADDRESS	CONTACT PERSON	PHONE#	E-MAIL ADDRESS	M/WBE?



**REGION 4**  
**DISADVANTAGED BUSINESS ENTERPRISE (DBE) NEGOTIATED RATES**  
**(Subject to change - refer to grant award for specific fair share objectives)**

KENTUCKY

Construction: (both programs)	4.10% MBE and 4.60% WBE
Equipment:	1.10% MBE and 1.20% WBE
Services:	10.8% MBE and 18.6% WBE
Supplies:*	3.40% MBE and 6.30% WBE



**BONDS AND INSURANCE**

The minimum requirements shall be as follows:

Bonding requirements for contracts of \$100,000 or less are contained in 40 CFR 31.36(h).

Bond requirements for contracts in excess of \$100,000 are:

- Bid guarantee equivalent to five percent of the bid price. The bid guarantee shall consist of a firm commitment such as a certified check or bid bond submitted with the bid;
- Performance bond equal to 100 percent of the contract price, and
- Payment bond equal to 100 percent of the contract price. Bonds must be obtained from companies holding Certificates of Authority as acceptable sureties, issued by the U.S. Treasury.

Insurance requirements are contained in the General Conditions of the contract. In addition to the other required insurance, the owner or the contractor, as appropriate, must acquire any flood insurance made available by the Federal Emergency Management Agency as required by 44 CFR Parts 59-79, if construction will take place in a flood hazard area identified by the Federal Emergency Management Agency. The owner's requirements on Flood Insurance are contained in the Special Conditions Section of the Contracts Documents.

**OUTLAY MANAGEMENT**

The contractor must provide a contract progress schedule of percentage of work in place and costs against time; and a schedule of projected payments (cumulative) for construction and for the architectural/engineering contract when the contract is awarded. The payment schedule must be submitted, in a format similar to the attached sample, to the owner for forwarding to the State when the contract is awarded, and whenever actual payments on a project vary beyond -5 percent and +10 percent from the schedule, as determined by the grantee.

Contractor will be required to review each of these contract schedules during the month of June and to submit revised schedules, as necessary, no later than July 1<sup>st</sup> of each year.

CONSTRUCTION AND OUTLAY SCHEDULE

Project No.: \_\_\_\_\_

Applicant: \_\_\_\_\_

Contract Identification: \_\_\_\_\_

Description of Contract: \_\_\_\_\_

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(INSTRUCTIONS FOR USE ON REVERSE SIDE)

SCHEDULE I – CONSTRUCTION SCHEDULE

Date for Advertisement: \_\_\_\_\_

Date for Opening Bids: \_\_\_\_\_

Pre-Construction Conference Date: \_\_\_\_\_

Date of Contract Award: \_\_\_\_\_

Contract Period: \_\_\_\_\_ days. Projected Contract Completion Date: \_\_\_\_\_

Total Eligible Contract Amount: \_\_\_\_\_

Work Order Date: \_\_\_\_\_

Start Construction Date: \_\_\_\_\_

Contract Completed: \_\_\_\_\_

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SCHEDULE II – CUMULATIVE OUTLAY SCHEDULE (55% EPA Share) – Projection  
only for quarters that remain in the fiscal year (FY) plus cumulative  
annual amount for the next FY.

Cum EPA Amount thru 1 <sup>st</sup> Qtr. Oct./Dec.:	\$ _____
Cum EPA Amount thru 2 <sup>nd</sup> Qtr. Jan./Mar.:	\$ _____
Cum EPA Amount thru 3 <sup>rd</sup> Qtr. Apr./June:	\$ _____
Cum EPA Amount thru 4 <sup>th</sup> Qtr. July/Sept.:	\$ _____
Cum EPA Amount for Next Fiscal Year:	\$ _____

## INSTRUCTIONS (Construction and Outlay Schedules)

To insure timely achievement of the grant objectives the owner (grantee) must provide EPA with a grants activities schedule, contract construction schedules and corresponding payment outlay schedules for the grant and each contract under the grant. One copy of information similar to that showing the Construction and Outlay Schedule Form will be submitted for the grant schedule with the grant acceptance. A separate form will accompany each contract at time of contract award.

- A. The grant activities schedule shall depict the period from grant award through grant closeout and cover all major milestone date. The grant activities schedule shall include Schedule I information items as well as other appropriate items necessary to monitor the grant. Schedule II shall be filled out to estimate the cumulative (all construction and architectural/engineering contracts) payment schedule to be requested by the grantee from EPA during the grant period, and whenever actual outlays vary beyond -5% and +10% from the schedule.
- B. Individual contractor's construction schedules for each contract will be submitted to support the grant activities schedule. The Schedule I shall be submitted prior to date of advertisement of each contract and Schedule II along with the contractor's construction schedule shall be submitted seven (7) calendar days prior to the dates of the pre-construction conference. The contractor's construction schedule shall depict the contractor's plan for completing all contract requirements and show work placement in dollars versus contract time. Schedule II shall depict the contract payment outlay by month or quarter. The contract schedule will be coordinated with all parties at the pre-construction conference.

The grants activities schedule, contractor construction schedules, will be the basis for monitoring progress towards completion of the project. The schedules shall be maintained at the available for inspection and updated at least monthly. The schedules shall be revised to incorporate approved change orders as they occur.

All of the schedules will be submitted to the State Division of Water.

**NOTICE OF INTENT**

All construction projects with surface disturbance of more than 1 acre during the period of construction must have a KPDES Storm Water General Permit. The permit can be found at the following web address:

<https://dep.gateway.ky.gov/eForms/default.aspx?FormID=7>.

If you have any questions regarding the completion of this form call the Surface Water Permits Branch, at (502) 564-3410.

## DAVIS BACON REQUIREMENTS

Federal Davis-Bacon rates are applicable for these funds. This determination applies only to the loan portion of this project. Please contact the other funding sources, if applicable, for their requirements pertaining to federal wage rates. You must contact the Kentucky Labor Cabinet for determination of applicable state wages.

(a) The Agency head shall cause or require the contracting officer to 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 public building or public work, or building or work 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, the following clauses (or any modifications thereof to meet the particular needs of the agency, Provided, That such modifications are first approved by the Department of Labor):

(1) Minimum wages. (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), 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.

(ii)(A) The contracting officer 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 contracting officer shall approve 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 contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will

approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer 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 contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt 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 (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of 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 (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), 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 (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). 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 (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted 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 weekly transmittals. 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 (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), 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 sponsoring government agency (or the applicant, sponsor, or owner).

(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 (write the name of the agency) 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 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 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 (write in the name of the Federal agency) may by appropriate instructions require, 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 the contracting agency, 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.

(b) Contract Work Hours and Safety Standards Act. The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(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 §5.5(a) or 4.6 of part 4 of this title. 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 (b)(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 (b)(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 (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor 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 (b)(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 (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in §5.1, the Agency Head shall cause or require the contracting officer to 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 Agency Head shall cause or require the contracting officer to 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.

## 5. Compliance Verification

(a) The subrecipient shall periodically interview, a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on an assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date of the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office.

## WAGE RATE REQUIREMENTS UNDER FY2013 APPROPRIATIONS

CWSRF: The recipient agrees to include in all agreements to provide assistance for the construction of treatment works carried out in whole or in part with such assistance 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 with such assistance made available under section 205(m) of that Act (33 U.S.C. 1285(m)), or both, a term and condition requiring compliance with the requirements of section 513 of that Act (33 U.S.C. 1372) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions. All contracts and subcontracts for the construction of treatment works carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as set forth below entitled “Wage Rate Requirements Under FY 2010 Appropriations.” This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009 and before October 1, 2010.

DWSRF: The recipient agrees to include in all agreements to provide assistance for any construction project carried out in whole or in part with such assistance 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), a term and condition requiring compliance with the requirements of section 1450(e) of the Safe Drinking Water Act (42 U.S.C. 300j-9(e)) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions. All contracts and subcontracts for any construction project carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as set forth below entitled “Wage Rate Requirements Under FY 2010 Appropriations.” This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009 and before October 1, 2010.

### Wage Rate Requirements Under FY 2013 Appropriations Act

#### Preamble

With respect to the Clean Water and Safe Drinking Water State revolving Funds, EPA provides capitalization grants to each State which in turn provides subgrants or loans to eligible entities within the State. Typically, the subrecipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions set forth under Roman Numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Occasionally, the subrecipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for compliance as described in Section II-5.

### **I. Requirements under FY 2013 Appropriations Act For Subrecipients That Are Governmental Entities:**

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance under the FY 2013 Appropriations Act with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact **(insert name or organizational unit Regional EPA DB contact)** for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/esa/whd/recovery/>

#### **1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.**

Under the FY 2013 Appropriations Act, DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

#### **2. Obtaining Wage Determinations.**

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the

solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### **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  
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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](http://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 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., 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 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.

(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.

(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.

## **5. Compliance Verification.**

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during

the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractor's use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm>.

## **II. Requirements under FY 2013 Appropriations Act For Subrecipients That Are Not Governmental Entities**

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance under the FY2010 Appropriations Act with respect to subrecipients that are not governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. If a State recipient needs guidance, the recipient may contact **Grants, Finance and Cost Recovery Branch, Regional EPA DB contact at (404) 562-9278** for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site.

**Under these terms and conditions, the subrecipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in any solicitation, contract task orders, work assignments, or similar instruments to existing contractors.**

### **1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.**

Under the FY 2013 Appropriation, Davis-Bacon prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

### **2. Obtaining Wage Determinations.**

(a) Subrecipients must obtain proposed wage determinations for specific localities at [www.wdol.gov](http://www.wdol.gov). After the Subrecipient obtains its proposed wage determination, it must submit the wage determination to (insert contact information for State recipient DB point of contact for wage determination) for approval prior to inserting the wage determination into a solicitation, contract or issuing task orders, work assignments or similar instruments to existing contractors

(ordering instruments unless subsequently directed otherwise by the State recipient Award Official.

(b) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### 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](http://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 report, 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 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 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.**

(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 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 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.

(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 (b)(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 (b)(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 (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The subrecipient shall upon the request of the EPA Award Official or an authorized representative of the Department of Labor, 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 (b)(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 (b)(1) through (4) of this section.

(c) 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.

## **5. Compliance Verification.**

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB . In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm> or it's successor site.

**SECTION 00820**  
**SPECIAL CONDITIONS**

**PART 1 - GENERAL**

**1.1 GENERAL**

- A. These specifications and the drawing accompanying them describe the work to be done and the materials to be furnished for the construction of the Project.
- B. The Contractor and each subcontractor shall be responsible for verification of all measurements at the site before ordering any materials or doing any work. No extra charge or compensation shall be allowed due to differences between actual dimensions and dimensions indicated on the drawings. Any such discrepancy in dimensions which may be found shall be submitted to the Engineer for his consideration before the Contractor proceeds with the work in the affected areas.

**1.2 SPECIAL SCHEDULE CONDITIONS**

- A. The Contract must be complete within the Contract Time(s) as specified in the Agreement.
- B. In Basin Construction Period - No work can begin that requires taking a plant basin out of service until November 1, 2015 and must be completed by April 15, 2016, unless approved by Owner and Engineer in advance.
- C. The Fort Thomas plant consists of four (4) treatment basins capable of treating 11 MGD each. **The Fort Thomas Treatment Plant shall be capable of FULL production (44 MGD) between April 15 and November 1 each year. The Contractor shall not anticipate any shutdowns or reduced plant capacity during this period unless approved in writing by Owner.** At no time during the November 1 to April 15 "in basin" construction period can the plant capacity be reduced below 33 MGD unless otherwise stated in these Specifications or in the Contract Drawings, or approved in advance by the Owner. The only exceptions are the following:
  - 1. The plant capacity may be reduced to 22 MGD during the time period in which the work in the rapid mix basin #1 is being performed. The Contractor must minimize to the highest degree possible the length of time in which the Rapid Mix #1 is out of service.
  - 2. The plant may be temporarily taken out of service completely as set forth in the Contract Drawings for installation and/or removal of the temporary bulkhead in the Basin #2 and #3 effluent flume.
- D. See also, Specification 01015 for more construction schedule sequencing requirements.

**1.3 ORDERING MATERIALS**

- A. Immediately following award of contract for this work, the Contractor shall determine length of time required for delivery of all materials, including materials of subcontractors and orders shall be placed for such materials promptly.
- B. If, for any reason, any item specified will not be available when needed and the Contractor can show that he has made a reasonably persistent effort to obtain the item(s) in question, the Engineer shall be notified in writing within thirty (30) days after the contract is signed. Otherwise, the Contractor will not be excused for delays in securing the material specified and will be held accountable if completion of the work is thereby delayed.



- C. The Project schedule intent is such that the Contractor utilizes the time period following the issuance date of the Notice of Award and the November 1 “in basin construction period” start date to complete the shop drawing review process, order all equipment and materials based on projected fabrication lead times (up to 20 weeks), complete construction schedules and staging plans, and any work that can be completed in advance of taking the basins out of service. It is the Contractor’s responsibility to coordinate the ordering of materials such that all the major pieces of equipment and materials are available and ready for installation when beginning the work that requires taking plant basins out of service to minimize plant down time.

**1.4 DELIVERY OF CONSTRUCTION MATERIALS**

- A. The Contractor shall receive, accept and make provisions for the delivery and unloading of all construction materials. Under no circumstances will the Owner be responsible for accepting delivery of materials.

**END OF SECTION**

**SECTION 00829**  
**WAGE RATE REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The Contractor shall conform to all provisions of Federal Labor Law and Federal Regulations, relative to wages and hours as they may apply to the work to be accomplished under these Specifications.
- B. In addition to the above, certain laws and regulations of the Kentucky Department of Labor shall govern the work and shall supplement or supplant Federal Labor Law and Regulations cited above. Should the Federal and Kentucky Labor Laws and Regulations conflict, the more stringent of the two shall apply.

**1.2 WAGE RATES**

- A. State and Federal wage rates **do** apply to this project. The General Contractor and all Subcontractors shall pay wages to all workmen not less than the wages and fringe benefits listed for the craft or trade and type of construction project in which they are employed, as shown in SECTION 00830 - WAGE DETERMINATION SCHEDULE. Where differing amounts of wages and fringe benefits are shown on the State and Federal Determination Schedules, the higher of the two shall apply. The requirements for determination of overtime pay shall be as required by the Kentucky Labor Cabinet; unless written consent is obtained from each employee to utilize the Federal Labor Law, which is less stringent.

**END OF SECTION**

**SECTION 00830**  
**WAGE DETERMINATION SCHEDULE**

**PART 1 - GENERAL**

**1.1 WAGE DETERMINATION DECISIONS**

- A. The federal and Kentucky state wage determination decisions are attached hereto on the following pages.

**END OF SECTION**

**FEDERAL**  
WAGE DETERMINATION SCHEDULE

General Decision Number: KY150144 01/02/2015 KY144

Superseded General Decision Number: KY20140144

State: Kentucky

Construction Type: Heavy

County: Campbell County in Kentucky.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is 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 \$10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number 0 Publication Date 01/02/2015

ASBE0008-007 07/01/2014

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR.....	\$ 29.05	14.27

\* ELEC0369-008 05/28/2014

	Rates	Fringes
ELECTRICIAN.....	\$ 29.88	14.78

ENGI0018-016 05/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Backhoe/Excavator/Trackhoe).....	\$ 32.44	13.90

ENGI0181-016 06/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 1.....	\$ 27.66	14.15

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Crane; Forklift

Operators on cranes with boom 150 feet and over, including jib, shall receive \$0.75 above Group 1. All cranes with piling leads will receive \$0.50 above Group 1 rate regardless of boom length. Combination rate shall mean \$0.50 per hour above the basic hourly rate of pay.

Employees assigned to work below ground level are to be paid 10% above basic wage rate. This does not apply to open cut work.

ENGI0181-019 07/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 1.....	\$ 28.85	14.15
GROUP 2.....	\$ 26.24	14.15
GROUP 3.....	\$ 26.65	14.15
GROUP 4.....	\$ 25.95	14.15

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Drill; Pumpcrete; Roller (Bituminous)

GROUP 2 - Bobcat/Skid Steer/Skid Loader; Concrete Pump; Roller (Rock)

GROUP 3 - Articulating Truck Operator

GROUP 4 - Pump; Roller (Earth)

Operators on cranes with booms 150 feet and over (including jib) shall receive \$1.00 above Group 1 rate; 250 feet and over including jib shall receive \$1.50 above Class 1 rate. Combination Rate: All crane operators operating cranes, where the length of the boom in combination with the length of the piling leads equal or exceeds 150 feet, shall receive \$1.00 above the Group 1 rate.

Employees assigned to work below ground level are to be paid 10% above basic wage rate. This does not apply to open cut work.

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IRON0044-005 06/01/2013

	Rates	Fringes
IRONWORKER (STRUCTURAL AND REINFORCING).....	\$ 25.00	18.40

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IRON0070-011 06/01/2014

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 26.97	19.75

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LABO0189-016 07/01/2014

	Rates	Fringes
LABORER Concrete Worker & Grade Checker.....	\$ 21.80	11.96
Tamper (Hand Held/Walk Behind).....	\$ 22.05	11.96

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LABO0265-005 05/01/2014

	Rates	Fringes
LABORER Concrete Saw (Hand Held/Walk Behind) & Pipelayer.....	\$ 27.89	9.80
Flagger & Landscape.....	\$ 27.72	9.80

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SUKY2011-021 06/25/2014

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 24.80	8.76
LABORER: Common or General.....	\$ 22.24	9.63
LABORER: Concrete Finishing.....	\$ 25.75	8.60
OPERATOR: Bulldozer.....	\$ 28.04	13.00
OPERATOR: Loader.....	\$ 26.68	13.00
OPERATOR: Mechanic.....	\$ 28.60	11.83
OPERATOR: Oiler.....	\$ 24.34	13.00
OPERATOR: Trencher.....	\$ 26.27	12.37
TRUCK DRIVER: Dump Truck.....	\$ 17.82	3.26

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

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.

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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

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**KENTUCKY STATE**  
WAGE DETERMINATION SCHEDULE



**Steven L. Beshear**  
Governor

**KENTUCKY LABOR CABINET**  
DEPARTMENT OF WORKPLACE STANDARDS  
DIVISION OF EMPLOYMENT STANDARDS,  
APPRENTICESHIP & MEDIATION  
1047 US Hwy 127 S - Suite 4  
Frankfort, Kentucky 40601  
Phone: (502) 564-3534  
Fax (502) 696-1897  
[www.labor.ky.gov](http://www.labor.ky.gov)

**Larry Roberts**  
Secretary

**Anthony Russell**  
Commissioner

January 8, 2015

Brett Fisher  
HDR Engineering Inc.  
2517 Sir Barton Way  
Lexington KY 40509

Re: NK Water District, Ft Thomas Treatment Plant Basin Improvements

Advertising Date as Shown on Notification: January 15, 2015

Dear Brett Fischer:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR 2-024, dated December 22, 2014 for CAMPBELL County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 019-H-00535-14-2, Heavy/Highway

Sincerely,

Anthony Russell  
Commissioner



KENTUCKY LABOR CABINET  
PREVAILING WAGE DETERMINATION  
CURRENT REVISION  
LOCALITY 24

**BRACKEN, CAMPBELL & PENDLETON COUNTIES**

Determination No. CR 2-024 2014

Date of Determination: December 22, 2014

**PROJECT NO. 019-H-00535-14-2**

\_\_\_\_\_ **BLDG**    \_\_\_x\_\_\_ **HH**

This schedule of the prevailing rate of wages for Bracken, Campbell & Pendleton Counties has been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR 2-024 2014.

Apprentices shall be permitted to work as such subject to Administrative Regulations 803 KAR 1:010. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) hours per day, and/or in excess of forty (40) hours per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one calendar day, but not more than ten (10) hours worked in any one calendar day, if such written agreement is prior to the over eight (8) hours in a calendar day actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked.

Fringe benefit amounts are applicable for all hours worked except when otherwise noted. Welders will receive rate for craft in which welding is incidental.

NOTE: The type of construction shall be determined by applying the following definitions:

**BUILDING CONSTRUCTION**

Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

**HIGHWAY CONSTRUCTION**

Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

**HEAVY CONSTRUCTION**

Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.



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Anthony Russell, Commissioner  
Department of Workplace Standards  
Kentucky Labor Cabinet

Determination No. CR 2-024 2014  
December 22, 2014

**ASBESTOS/INSULATION WORKERS:**

Including duct (cold/hot), pipe insulator, pipe wrapping):

BASE RATE \$29.05  
 FRINGE BENEFITS 14.27

Hazardous Material Handler ((Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems):

BASE RATE \$23.60  
 FRINGE BENEFITS 9.80

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**BOILERMAKERS:**

BASE RATE \$35.79  
 FRINGE BENEFITS 16.71  
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**BRICKLAYERS:**

BRACKEN, CAMPBELL & PENDLETON COUNTIES:

Bricklayers: BUILDING BASE RATE \$21.86  
 FRINGE BENEFITS 4.75

Tile Setters: BUILDING BASE RATE \$25.54  
 FRINGE BENEFITS 11.64

Tile Finishers: BUILDING BASE RATE \$22.90  
 FRINGE BENEFITS 10.87

CAMPBELL & PENDLETON COUNTIES:

Bricklayer: HEAVY HIGHWAY BASE RATE \$26.50  
 FRINGE BENEFITS 11.17

BRACKEN COUNTY:

Bricklayer HEAVY HIGHWAY BASE RATE 26.57  
 FRINGE BENEFITS 10.26  
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**CARPENTERS / BUILDING:**

BRACKEN, CAMPBELL & PENDLETON COUNTIES:

Drywall Hanging & Metal Stud Installation Only: BUILDING BASE RATE \$21.58  
 FRINGE BENEFITS 13.41

**CARPENTERS / BUILDING:**

BRACKEN & PENDLETON COUNTIES:

(Excludes Drywall Hanging & Metal Stud Installation): BASE RATE \$18.86  
 FRINGE BENEFITS 6.71

**CARPENTERS / BUILDING:**

CAMPBELL COUNTY:

(Excludes Drywall Hanging & Metal Stud Installation) BASE RATE \$14.00  
 FRINGE BENEFITS .54

**CARPENTERS / HEAVY/HIGHWAY:**

CAMPBELL & PENDLETON COUNTIES:

Carpenters & Piledrivermen: HEAVY & HIGHWAY BASE RATE \$27.05  
 FRINGE BENEFITS 9.69

Divers: HEAVY & HIGHWAY

BASE RATE \$40.58  
 FRINGE BENEFITS 9.69

**CARPENTERS / HEAVY HIGHWAY:**  
**BRACKEN COUNTY:**

Carpenter:	HEAVY HIGHWAY	BASE RATE	\$27.50
		FRINGE BENEFITS	14.96
Diver:	HEAVY HIGHWAY	BASE RATE	\$41.63
		FRINGE BENEFITS	14.96
Piledriver:	HEAVY HIGHWAY	BASE RATE	27.75
		FRINGE BENEFITS	14.96

**CEMENT MASONS / CONCRETE FINISHERS:**

BUILDING	BASE RATE	\$22.00
	FRINGE BENEFITS	12.55
HEAVY & HIGHWAY	BASE RATE	\$25.75
	FRINGE BENEFITS	8.60

**ELECTRICIANS:**

Electricians:	BASE RATE	\$26.74
	FRINGE BENEFITS	16.45

**LINE CONSTRUCTION:**

Lineman:	BUILDING	BASE RATE	\$30.50
		FRINGE BENEFITS	11.15
Equipment Operator:	BUILDING	BASE RATE	\$27.45
		FRINGE BENEFITS	10.51
Groundman:	BUILDING	BASE RATE	\$19.83
		FRINGE BENEFITS	8.92
SOUND & COMMUNICATION TECHNICIAN:	BASE RATE	\$22.50	
	FRINGE BENEFITS	9.51	

**ELEVATOR MECHANICS:**

BASE RATE	\$37.47
FRINGE BENEFITS	20.035

**GLAZIERS:**

BASE RATE	\$15.45
FRINGE BENEFITS	0.00

**IRONWORKERS:**

Ornamental & Structural:	BASE RATE	\$25.00
	FRINGE BENEFITS	18.40

Fence Erector:	BASE RATE	\$22.70
	FRINGE BENEFITS	18.40

**REINFORCING:**

BASE RATE	\$26.25
FRINGE BENEFITS	18.45

**LABORERS / BUILDING:**

CAMPBELL COUNTY:

Common or General:	BUILDING	BASE RATE	\$22.90
		FRINGE BENEFITS	9.20

Mason Tender-Cement/Concrete:	BUILDING	BASE RATE	\$14.45
		FRINGE BENEFITS	0.00

Pipelayer and Screw Operator:	BUILDING	BASE RATE	\$23.00
		FRINGE BENEFITS	9.20

LABORER	MASON TENDER-BRICK	BASE RATE	\$14.75
		FRINGE BENEFITS	2.04

**LABORERS / HEAVY HIGHWAY:**

CAMPBELL COUNTY:

GROUP 1 - Asphalt Laborer; Carpenter Tender; Concrete Curing Applicator; Dump Man (Batch Truck); Guardrail and Fence Installer; Joint Setter; Laborer (Construction); Landscape Laborer; Mesh Handlers & Placer; Right-of-way Laborer; Riprap Laborer & Grouter; Scaffold Erector; Seal Coating; Surface Treatment or Road Mix Laborer; Sign Installer; Slurry Seal; Utility Man; Bridge Man; Handyman; Waterproofing Laborer; Flagperson; Hazardous Waste (level D); Diver Tender; Zone Person & Traffic Control:

HEAVY & HIGHWAY	*BASE RATE	\$27.72
	FRINGE BENEFITS	9.80

GROUP 2 - Skid Steer; Asphalt Raker; Concrete Puddler; Kettle Man (Pipeline); Machine Driven Tools (Gas, Electric, Air); Mason Tender; Brick Paver; Mortar Mixer; Power Buggy or Power Wheelbarrow; Sheeting & Shoring Man; Surface Grinder Man; Plastic Fusing Machine Operator; Pug Mill Operator; & Vacuum Devices (wet or dry); Rodding Machine Operator; Diver; Screwman or Paver; Screed Person; Water Blast, Hand Held Wand; Pumps 4" & Under (Gas, Air or Electric) & Hazardous Waste (level C); Air Track and Wagon Drill; Bottom Person; Cofferdam (below 25 ft. deep); Concrete Saw Person; Cutting with Burning Torch; Form Setter; Hand Spiker (Railroad); Pipelayer; Tunnel Laborer (without air) & Caisson; Underground Person (working in Sewer and Waterline, Cleaning, Repairing & Reconditioning); Sandblaster Nozzle Person; & Hazardous Waste (level B):

HEAVY & HIGHWAY	*BASE RATE	\$27.89
	FRINGE BENEFITS	9.80

GROUP 3 - Blaster; Mucker; Powder Person; Top Lander; Wrencher (Mechanical Joints & Utility Pipeline); Yarnier; Hazardous Waste (level A); Concrete Specialist; Concrete Crew in Tunnels (With Air-pressurized - \$1.00 premium); Curb Setter & Cutter; Grade Checker; Utility Pipeline Tapper; Waterline; and Caulker:

HEAVY & HIGHWAY	*BASE RATE	\$28.22
	FRINGE BENEFITS	9.80

GROUP 4 - Miner (With Air-pressurized - \$1.00 premium); & Gunite Nozzle Person:

HEAVY & HIGHWAY	*BASE RATE	\$28.67
	FRINGE BENEFITS	9.80

**\*Signal Person will receive the rate equal to the rate paid the laborer classification for which he or she is signaling.**

**LABORERS / BUILDING:**  
BRACKEN & PENDLETON COUNTIES:

GROUP 1: Common or General and Landscape Laborer:			
	BUILDING	BASE RATE	\$23.36
		FRINGE BENEFITS	10.70
GROUP 2: Grade Checker and Mason Tender-Cement/Concrete, Mason Tender-Brick (Hod), Pipelayer and Screw Operator:			
	BUILDING	BASE RATE	\$23.76
		FRINGE BENEFITS	10.70
LABORER	MASON TENDER-BRICK	BASE RATE	\$14.75
		FRINGE BENEFITS	2.04
LABORER	MASON TENDER – CEMENT/CONCRETE	BASE RATE	\$14.45
		FRINGE BENEFITS	0.00

**LABORERS/HEAVY HIGHWAY:**  
BRACKEN & PENDLETON COUNTIES:

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup:

HEAVY & HIGHWAY	BASE RATE	\$21.80
	FRINGE BENEFITS	11.96

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushhammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller:

HEAVY & HIGHWAY	BASE RATE	\$22.05
	FRINGE BENEFITS	11.96

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster:

HEAVY & HIGHWAY	BASE RATE	\$22.10
	FRINGE BENEFITS	11.96

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Driller (All Types); Powderman & Blaster; Troxler & Concrete Tester if Laborer is Utilized:

HEAVY & HIGHWAY	BASE RATE	\$22.70
	FRINGE BENEFITS	11.96

**MILLWRIGHTS:**

BASE RATE	\$27.55
FRINGE BENEFITS	15.39

**OPERATING ENGINEERS / BUILDING:**

CAMPBELL & PENDLETON COUNTIES:

GROUP 1: Boom & Jib 250' & Over:			
	BUILDING	BASE RATE	\$33.49
		FRINGE BENEFITS	13.90
GROUP 2: Boom & Jib Over 180' through 249':			
	BUILDING	BASE RATE	\$33.24
		FRINGE BENEFITS	13.90
GROUP 3: Boom & Jib 150' through 180':			
	BUILDING	BASE RATE	\$32.74
		FRINGE BENEFITS	13.90
GROUP 4: Master Mechanic:	BUILDING	BASE RATE	\$32.49
		FRINGE BENEFITS	13.90
GROUP 5: Crane (Compact track or rubber over 4,000 lbs capacity, self erecting, stationary, track or truck (all configurations), elevating grader, forklift (rough terrain with winch/hoist), backhoe, backhoe track, trackhoe, hoist (2 or more drums), horizontal directional drill, rotary drill, slip form paver:			
	BUILDING	BASE RATE	\$32.24
		FRINGE BENEFITS	13.90
GROUP 6: Asphalt paver, bobcat-type and/or skid steer loader with how attachment greater than 7,000 lbs, bulldozer, endloader, power grader, power scraper:			
	BUILDING	BASE RATE	\$32.12
		FRINGE BENEFITS	13.90
GROUP 7: Forklift (except Masonry), highway drills-all types, hoist (1 drum):			
	BUILDING	BASE RATE	\$31.08
		FRINGE BENEFITS	13.90
GROUP 8: Roller (except asphalt), self propelled sub grader, tractor (pulling sheep foot roller or grader):			
	BUILDING	BASE RATE	\$29.90
		FRINGE BENEFITS	13.90
GROUP 9: Allen Screed Paver (concrete); Crane-Compact, Track or Rubber under 4,000 lbs.; Masonry Forklift; Oiler:			
	BUILDING	BASE RATE	\$24.44
		FRINGE BENEFITS	13.90
OPERATOR	BOBCAT/SKID LOADER	BASE RATE	\$20.77
		FRINGE BENEFITS	5.38
OPERATOR	COMPACTOR	BASE RATE	\$24.53
		FRINGE BENEFITS	0.00
OPERAOR	EXCAVATOR	BASE RATE	\$19.18
		FRINGE BENEFITS	5.16
OPERATOR	HIGHLIFT	BASE RATE	\$25.00
		FRINGE BENEFITS	0.00

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**OPERATING ENGINEERS / BUILDING (CONTINUED):**

**BRACKEN COUNTY:**

GROUP 1: Elevating Grader, Extendable Boom Forklift, Forklift (regardless of lift height), Loader, Motor scraper, Bulldozer, Backhoe/Excavator/Trackhoe, Mechanic, Power Blade, Motor Grader, Core Drill, Hoist, Rotary Drill:

BUILDING	BASE RATE	\$30.46
	FRINGE BENEFITS	14.15

GROUP 2: Crane (including Overhead, Truck, Tower & Hydraulic), hoist (1 drum), Hoisting Engine (2 or more drums):

BUILDING	BASE RATE	\$31.31
	FRINGE BENEFITS	14.15

GROUP 3: Form Grader, Tractor (50 HP & Over), Farm Tractor with Attachments (Except Backhoe, Highlift & End Loader), Elevator (when used for hoisting), Hoisting Engineer (1 Drum or Buck Hoist):

BUILDING	BASE RATE	\$25.92
	FRINGE BENEFITS	14.15

GROUP 4: Tractor (under 50 HP), Oiler, Truck Crane Oiler:

BUILDING	BASE RATE	\$24.60
	FRINGE BENEFITS	14.15

**OPERATING ENGINEERS / HEAVY HIGHWAY**

**CAMPBELL & PENDLETON COUNTIES:**

Master Mechanic & Boom from 150 to 180:

HEAVY & HIGHWAY	BASE RATE	\$32.69
	FRINGE BENEFITS	13.90

Boom from 180 & over:

HEAVY & HIGHWAY	BASE RATE	\$32.94
	FRINGE BENEFITS	13.90

GROUP 1: Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Capacity); Concrete Pump; Crane (All Types, Including Boom Truck, Cherry Picker); Crane-Compact, Track or Rubber over 4,000 lbs. capacity; Cranes-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment (All Types); Grade-All; Helicopter Crew (Operator-Hoist or Winch); Hoe (all types); Hoisting Engine on Shaft or Tunnel Work; Horizontal Directional Drill (over 500,000 ft. lbs. thrust); Hydraulic Gantry (Lifting System); Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) Diesel Tractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine (All Types); Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Rail Tamper (with auto lifting & aligning device); Refrigerating Machine (Freezer Operation); Rotary Drill, on Caisson work; Rough Terrain Fork Lift with Winch/Hoist; Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24" wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; & Wheel Excavator:

HEAVY & HIGHWAY	BASE RATE	\$32.44
	FRINGE BENEFITS	13.90

GROUP 2 - Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Hydro Milling Machine; Kolman-type Loader (production type-Dirt); Lead Greaseman; Lighting & Traffic Signal Installation Equipment (includes all groups or classifications); Material Transfer Equipment (Shuttle Buggy) Asphalt; Pettibone-Rail Equipment; Power Grader; Power Scraper; Push Cat; Rotomill (all), Grinders & Planers of All types; Trench Machine (24" wide & under); & Vermeer type Concrete Saw:

HEAVY & HIGHWAY	BASE RATE	\$32.32
	FRINGE BENEFITS	13.90

**OPERATING ENGINEERS / HEAVY HIGHWAY (CONTINUED):**  
**CAMPBELL & PENDLETON COUNTIES:**

GROUP 3: A-Frame; Air Compressor on Tunnel Work (low pressure); Asphalt Plant Engineer; Bobcat-type and/or Skid Steer Loader with or without Attachments; Highway Drills (all types); Locomotive (narrow gauge); Material Hoist/Elevator; Mixer, Concrete (more than one bag capacity); Mixer, one bag capacity (Side Loader); Power Boiler (Over 15 lbs. Pressure) Pump Operator installing & operating Well Points; Pump (4" & over discharge); Roller, Asphalt; Rotovator (lime soil stabilizer); Switch & Tie Tampers (without lifting & aligning device); Utility Operator (Small equipment); & Welding Machines:

HEAVY & HIGHWAY	BASE RATE	\$31.28
	FRINGE BENEFITS	13.90

GROUP 4 - Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway) except Masonry); Finishing Machine; Fireperson, Floating Equipment (all types); Fork Lift (highway); Form Trencher; Hydro Hammer; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); & Vibratory Compactor with Integral Power:

HEAVY & HIGHWAY	BASE RATE	\$30.10
	FRINGE BENEFITS	13.90

GROUP 5: Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt); Generator; Masonry Fork Lift; Inboard-Outboard Motor Boat Launch; Masonry Fork Lift; Oil Heater (asphalt plant); Oiler; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signalperson; Tire Repairperson; & VAC/ALLS:

HEAVY & HIGHWAY	BASE RATE	\$24.64
	FRINGE BENEFITS	13.90

**OPERATING ENGINEERS / HEAVY HIGHWAY**  
**BRACKEN COUNTY:**

GROUP 1: A-Frame Winch Truck; Auto Patrol; Backfiller; Batcher Plant; Bituminous Paver; Bituminous Transfer Machine; Boom Cat; Bulldozer; Mechanic; Cableway; Carry-all Scoop; Carry Deck Crane; Central Compressor Plant; Clamshell; Concrete Mixer (21 cu. ft. or Over); Concrete Paver; Truck-Mounted Concrete Pump; Core Drill; Crane; Crusher Plant; Derrick; Derrick Boat; Ditching & Trenching Machine; Dragline; Dredge Operator; Dredge Engineer; Elevating Grader & Loaders; Grade-All; Gurries; Heavy Equipment Robotics Operator/Mechanic; High Lift; Hoe-Type Machine; Hoist (Two or More Drums); Hoisting Engine (Two or More Drums); Horizontal Directional Drill Operator; Hydrocrane; Hyster; KeCal Loader; LeTourneau; Locomotive; Mechanic; Mechanically Operated Laser Screed; Mechanic Welder; Mucking Machine; Motor Scraper; Orangepeel Bucket; Piledriver; Power Blade; Pumpcrete; Push Dozer; Rock Spreader, attached to equipment; Rotary Drill; Roller (Bituminous); Scarifier; Scoopmobile; Shovel; Side Boom; Subgrader; Tailboom; Telescoping Type Forklift; Tow or Push Boat; Tower Crane (French, German & other types); Tractor Shovel; Truck Crane; Tunnel Mining Machines, including Moles, Shields or similar types of Tunnel Mining Equipment, Cherry Picker, Rough Terrain Crane:

HEAVY & HIGHWAY	*BASE RATE	\$28.85
	FRINGE BENEFITS	14.15

GROUP 2: Air Compressor (Over 900 cu. ft. per min.); Bituminous Mixer; Boom Type Tamping Machine; Bull Float; Concrete Mixer (Under 21 cu. ft); Dredge Engineer; Electric Vibrator; Compactor/Self-Propelled Compactor; Elevator (One Drum or Buck Hoist); Elevator (when used to Hoist Building Material); Finish Machine; Firemen & Hoist (One Drum); Flexplane; Forklift (Regardless of Lift Height); Form Grader; Joint Sealing Machine; Outboard Motor Boat; Power Sweeper (Riding Type); Roller (Rock); Ross Carrier; Skid Mounted or Trailer Mounted Concrete Pump; Skid Steer Machine with all Attachments; Switchman or Brakeman; Throttle Valve Person; Tractair & Road Widening Trencher; Tractor (50 HP or Over); Truck Crane Oiler; Tugger; Welding Machine; Well Points; & Whirley Oiler:

HEAVY & HIGHWAY	*BASE RATE	\$26.24
	FRINGE BENEFITS	14.15

**OPERATING ENGINEERS / HEAVY HIGHWAY (CONTINUED):**  
**BRACKEN COUNTY:**

GROUP 3: All Off Road Material Handling Equipment, Including Articulating Dump Trucks; Greaser on Grease Facilities servicing Heavy Equipment:

HEAVY & HIGHWAY	*BASE RATE	\$26.65
	FRINGE BENEFITS	14.15

GROUP 4: Bituminous Distributor; Burlap & Curing Machine; Cement Gun; Concrete Saw; Conveyor; Deckhand Oiler; Grout Pump; Hydraulic Post Driver; Hydro Seeder; Mud Jack; Oiler; Paving Joint Machine; Power Form Handling Equipment; Pump; Roller (Earth); Steersman; Tamping Machine; Tractor (Under 50 HP); & Vibrator:

HEAVY & HIGHWAY	*BASE RATE	\$25.95
	FRINGE BENEFITS	14.15

**\*Cranes with booms 150 ft. & over (including jib) \$1.00 premium.**  
**Employees assigned to work below ground level are to be paid 10% above basic wage rate.**  
**This does not apply to open cut work.**

**PAINTERS / BUILDING:**

Brush & Roller Only:	BUILDING	BASE RATE	\$21.52
		FRINGE BENEFITS	5.30
Spray Only:	BUILDING	BASE RATE	\$23.89
		FRINGE BENEFITS	8.71
Sign Painter & Erector:	BUILDING	BASE RATE	\$20.23
		FRINGE BENEFITS	3.25

**PAINTERS / HEAVY/HIGHWAY**

BRACKEN, CAMPBELL & PENDLETON COUNTIES:

Bridge/Equipment Tender and/or Containment Builder:	HEAVY & HIGHWAY	BASE RATE	\$20.73
		FRINGE BENEFITS	8.71
Brush & Roller:	HEAVY & HIGHWAY	BASE RATE	\$23.39
		FRINGE BENEFITS	8.71
Spray:	HEAVY & HIGHWAY	BASE RATE	\$23.89
		FRINGE BENEFITS	8.71
Sandblasting; Waterblasting:	HEAVY & HIGHWAY	BASE RATE	\$24.14
		FRINGE BENEFITS	8.71
Bridge:	HEAVY & HIGHWAY	BASE RATE	\$24.39
		FRINGE BENEFITS	8.71

**PLASTERERS:**

BUILDING	BASE RATE	\$22.00
	FRINGE BENEFITS	10.10

**PLUMBERS & PIPEFITTERS:**

(Including HVAC Pipe & System Installation):	BASE RATE	\$29.80
	FRINGE BENEFITS	17.79

**ROOFERS:** (excluding metal roofs):

(Including built up roof, modified bitumen roof, rubber roof, shake & shingle roof, single ply roof):			
		BASE RATE	\$26.31
		FRINGE BENEFITS	12.30

**SHEETMETAL WORKERS**

**CAMPBELL COUNTY:**

(HVAC duct installation only):		BASE RATE	\$26.86
		FRINGE BENEFITS	17.08

Excluding HVAC duct installation:

		BASE RATE	\$15.50
		FRINGE BENEFITS	1.06

**SHEETMETAL WORKERS**

**BRACKEN & PENDLETON COUNTIES:**

(including metal roofs & HVAC duct installation):		BASE RATE	\$28.66
		FRINGE BENEFITS	18.03

**SPRINKLER FITTERS:**

(Fire Sprinklers)		BASE RATE	\$30.14
		FRINGE BENEFITS	17.12

**TRUCK DRIVERS / BUILDING:**

**BRACKEN, CAMPBELL & PENDLETON COUNTIES:**

10 Yard Truck:	BUILDING	BASE RATE	\$16.27
		FRINGE BENEFITS	1.50

Dump Truck: BUILDING

		BASE RATE	\$15.47
		FRINGE BENEFITS	2.74

**TRUCK DRIVERS / HEAVY/HIGHWAY:**

**CAMPBELL & PENDLETON COUNTIES:**

Driver:	HEAVY & HIGHWAY	BASE RATE	\$15.85
		FRINGE BENEFITS	4.60

Euclid Wagon; End Dump; Lowboy; Heavy Duty Equipment; Tractor-Trailer Combination; & Drag:  
 HEAVY & HIGHWAY

		BASE RATE	\$16.29
		FRINGE BENEFITS	4.60

**TRUCK DRIVERS / HEAVY/HIGHWAY:**

**BRACKEN COUNTY:**

Mobile Batch Truck Tender:	HEAVY & HIGHWAY	BASE RATE	\$16.57
		FRINGE BENEFITS	7.34

Greaser, Tire Changer, & Mechanic Tender:  
 HEAVY & HIGHWAY

		BASE RATE	\$16.68
		FRINGE BENEFITS	7.34

Single Axle Dump & Flatbed; Semi-Trailer or Pole Trailer when used to pull building materials & equipment;  
 Tandem Axle Dump; Distributor; Mixer & Truck Mechanic:  
 HEAVY & HIGHWAY

		BASE RATE	\$16.86
		FRINGE BENEFITS	7.34

**TRUCK DRIVERS / HEAVY/HIGHWAY (CONTINUED):**  
**BRACKEN COUNTY:**

Euclid, Other Heavy Earthmoving Equipment & Lowboy; Articulator Cat Truck, 5 Axle Vehicle; Winch & A-Frame when used in transporting materials; Ross Carrier; Forklift when used to transport building materials; & Pavement Breaker:

HEAVY & HIGHWAY	BASE RATE	\$16.96
	FRINGE BENEFITS	7.34

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**End of Document**  
**CR 2-024 2014**  
**December 22, 2014**

**SECTION 00900**

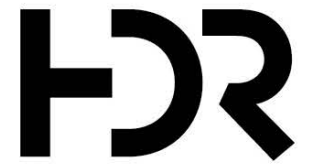
**ADDENDA**

**PART 1 - GENERAL**

**1.1 ADDENDA**

- A. All addenda issued during the bidding of the Project will be reproduced in the signed Contract Documents, on the pages following this heading sheet.

**END OF SECTION**



**D I V I S I O N 1**

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General Requirements

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**SECTION 01010**  
**SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Work to be completed at the 44 MGD Fort Thomas Treatment Plant in Fort Thomas, Kentucky. Major items of work included in this contract are listed below.
- B. The Contractor shall provide all materials, labor and equipment necessary for completion of the Project. The Contract Documents are intended to provide the basis for proper completion of the work suitable for the intended use of the Owner. Anything not expressly set forth but which is reasonably implied or necessary for proper performance of the Project shall be included.
- C. Continuous Operations: The existing system must be maintained in continuous operation in such a manner that it meets all local, state, and federal requirements. The Contractor is responsible not to deactivate, demolish, or interfere with any system component required for the continuous operation until a new or temporary permanent-like system has been installed and is operational. The Contractor is responsible for payment of all fines resulting from any action or inaction on its part or the part of its subcontractors during performance of the Work that causes the facility/facilities to operate in an illegal manner or fail to operate in a legal manner.
- D. The following major Work items are included in the Contract:
  - 1. Demolition of existing horizontal flocculators, clarifier sludge collection system, wooden baffle walls, rapid mix equipment, miscellaneous concrete, and miscellaneous electrical.
  - 2. Convert Basin #2 and #3 to three stage flocculation with concrete wall baffles
  - 3. Convert Basin #2 and #3 to vertical impeller flocculators and provide access walkways.
  - 4. Repair concrete around the top portion of exterior walls of Basin #2 and #3.
  - 5. Replace sludge collection system in Basin #2 and #3.
  - 6. Construct concrete baffle walls in rapid mix and install new rapid mixer.
  - 7. Replace influent and effluent slide gates to Basin #2 and #3.
  - 8. Replace 30" butterfly valves and electric actuators
  - 9. Replace 6" plug valves and electric actuators
  - 10. Complete miscellaneous concrete and electrical work
  - 11. Complete structural concrete repair work in filter building basement
  - 12. Complete filter bays paint restoration (if Additive Alternate No. 1 is Awarded)

**1.2 PERMITS**

- A. The Contractor shall obtain any permits related to or required by the Work in this Contract except those which the Owner has obtained, which are listed in the Supplementary Conditions, Section 00800.

**1.3 CODES**

- A. **All components, equipment, and materials to be used on this project must be of American manufacture and comply with the "Buy America Requirements" for Drinking Water State Revolving Funds and the Kentucky Infrastructure Authority.**
- B. Comply with applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices, citations and similar communications, to the Owner.
- C. All components and materials to be in contact with process related water must be NSF-61 certified for use in drinking water applications. Manufacturer and Contractor to verify.



#### **1.4 EXISTING CONDITIONS AND DIMENSIONS**

- A. The Work in this Contract will primarily be performed in or around existing facilities of which a portion must remain functional. The Contractor must maintain the required items and/or systems functional without additional effort by the Owner's personnel and at no extra costs to the Owner.
- B. The Contractor is responsible for verifying all existing conditions, elevations, dimensions, etc., and providing its finished work to facilitate existing conditions.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01015 SEQUENCE OF WORK**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. The Contractor shall conform to all miscellaneous requirements as contained in the Contract.
- B. The Contractor shall perform all Work included in the Contract Documents and Drawings.
- C. The Contractor shall perform all Work incidental to the items shown in the Contract Documents even though it may not be specifically enumerated.
- D. The Contractor will have to perform the work in a sequence acceptable to the Owner, and in some instances the Work will have to be performed in a sequence directed by the Owner.
- E. Further, the Contractor shall have to perform all the Work included in this project in a sequence that does not cause undue hardships on day-to-day operating personnel.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 00700 - General Conditions.
- B. Section 01010 - Summary of Work.
- C. Section 01040 - Coordination.

### **PART 2 - PART 2 - PRODUCTS (NOT APPLICABLE)**

### **PART 3 - PART 3 - EXECUTION**

#### **3.1 SCHEDULING THE SEQUENCE OF CONSTRUCTION OPERATIONS**

- A. The Contractor shall submit to the Engineer, for review and approval, a complete schedule (progress chart) of its proposed sequence of construction operations prior to commencement of the work.
- B. The Contractor shall schedule the various construction activities to complete the Project throughout the entire Contract time period. This schedule requirement shall not prevent the Contractor from completing the Project in a shorter time frame than illustrated in the schedule. The construction schedule along with a cost breakdown schedule shall be reviewed and approved by the Owner prior to the submission of the first partial payment request in accordance with the General Conditions.
- C. A copy of the construction schedule shall be submitted to the Owner with each pay request, appropriately marked to indicate the actual progress of the work compared to the planned schedule. This revised schedule must be approved by the Owner prior to payment.

- D. The Fort Thomas plant consists of four (4) treatment basins capable of treating 11 MGD each. **The Fort Thomas Treatment Plant shall be capable of FULL production (44 MGD) between April 15 and November 1 each year. The Contractor shall not anticipate any shutdowns or reduced plant capacity during this period unless approved in writing by Owner.** At no time during the November 1 to April 15 “in basin” construction period can the plant capacity be reduced below 33 MGD unless otherwise stated in these Specifications or in the Contract Drawings, or approved in advance by the Owner. The only exceptions are the following:
1. The plant capacity may be reduced to 22 MGD during the time period in which the work in the rapid mix basin #1 is being performed. The Contractor must minimize to the highest degree possible the length of time in which the Rapid Mix #1 is out of service.
  2. The plant may be temporarily taken out of service completely as set forth in the Contract Drawings for installation and/or removal of the temporary bulkhead in the Basin #2 and #3 effluent flume.
- E. Rapid Mix #1 and the 30” influent butterfly valves cannot be isolated for construction without taking both Basin #2 and #3 out of service, as Rapid Mix #1 feeds both Basin #2 and #3.
- F. The 48” effluent slide gates on Basin #2 and #3 cannot be isolated for removal without first installing a temporary bulkhead in the effluent flume inside the filter building. To install the temporary bulkhead, the entire plant must be temporarily taken out of service. The Contractor shall be mindful of this and prepare to install the temporary bulkhead within 4 hours. The plant may not be shut down completely for more than 4 hours unless approved in writing by the Owner in advance.
- G. The Contractor is encouraged to sequence work such that Basin #2 and #3 are constructed consecutively as opposed to concurrently to allow for one basin to be put back into service following the completion of the work in Rapid Mix #1 while the other basin is being constructed.
- H. The Contractor shall coordinate the installation of temporary heat tracing, insulation, or other means of freeze protection measures as necessary to protect the existing chemical feed and raw water sample lines that run through Basin #3 during time periods when Basin #3 is drained and the outdoor temperature is at or below freezing. The Contractor shall monitor the weather each day to determine the need for freeze protection measures. Any damages caused to the exposed piping caused by freezing or construction efforts shall be repaired by the Contractor immediately and at his expense.

### 3.2 OTHER WORK SEQUENCE ITEMS

List other job or site specific items which must be considered in the work sequence.

- A. See construction staging plan in contract documents (Drawing 00G003)

**END OF SECTION**

**SECTION 01025**  
**MEASUREMENT AND PAYMENT**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, services and other necessary supplies and perform all work shown on the Drawings and/or described in the Specifications and Contract Documents at the unit or lump sum prices for the items enumerated in Part 2 of this Section.

**PART 2 - PRODUCTS**

**2.1 UNIT PRICE WORK ITEMS**

A. Item 1 – Walkway Surface Repair

1. Description: Item 1 includes all work implied or depicted on sheet 01S002 in the detail area designated as “walkway surface repair” including work in typical details S2.6 and S2.7 related to repair of the elevated concrete walkway between Basin #2 and #3.
2. Measurement: The quantity of “walkway surface repair” will be measured for payment on the basis of the units and estimated quantities as set forth in bid form for work Item 1 as Items 1a-1c.
3. Payment: The unit price payment for “walkway surface repair” will be full compensation for all repairs actually performed as shown and specified and not specifically included under other items and under other contracts. The unit price shall apply to actual quantities up to one hundred and fifty percent (150%) or to actual quantities within fifty percent (50%) less than the estimated quantities.

B. Item 2 –Typical Basin Crack Repair

1. Description: Item 2 includes all work implied or depicted on sheet 01S002 by typical detail S2.8 related to repair of miscellaneous surface cracks in concrete walls, floors, and associated appurtenances of Basin #2 and #3 and supporting facilities.
2. Measurement: The quantity of “Typical Basin Crack Repair” will be measured for payment on the basis of the units and estimated quantities as set forth in bid form for work Item 2 as Item 2a.
3. Payment: The unit price payment for “Typical Basin Crack Repair” will be full compensation for all repairs actually performed as shown and specified and not specifically included under other items and under other contracts. The unit price shall apply to actual quantities up to one hundred and fifty percent (150%) or to actual quantities within fifty percent (50%) less than the estimated quantities.

C. Item 3 –Existing Filter Building Structural Concrete Repair

1. Description: Item 3 includes all work implied or depicted on sheet 01S106.
2. Measurement: The quantity “Existing Filter Building Structural Concrete Repair” will be measured for payment on the basis of the units and estimated quantities as set forth in bid form for work Item 3 as Items 3a-3e.

3. Payment: The unit price payment for “Existing Filter Building Structural Concrete Repair” will be full compensation for all repairs actually performed as shown and specified and not specifically included under other items and under other contracts. The unit price shall apply to actual quantities up to one hundred and fifty percent (150%) or to actual quantities within fifty percent (50%) less than the estimated quantities.

D. Item 4 –General Construction

1. **Description: Item 4 includes all work depicted or implied in the project plans and specifications that is not included in work items 1-3 above.**
2. Measurement and Payment: The work included under “General Construction” will be not be measured for separate measurement and payment and shall be bid as a “Lump Sum” as Item 4a.
3. Schedule of Values: Within fifteen (15) days following the Pre-Construction Conference, the Contractor shall prepare and submit a periodic schedule of values for the work included in item 4. The estimate form will depict the Contractor's cost for completing the Contract requirements and show by major unit of the project work the Contractor's dollar value for the material and the labor (two separate amounts) to be used as a basis for the periodic payments. The Contractor's periodic estimate breakdown must be approved by the Owner before any payments will be made on this Contract.

The following items shall be included in the breakdown for the lump sum work in item 4:

- a. Mobilization: Payment for the Contractor’s mobilization shall include all costs incurred for moving equipment onto the project area and any pertinent costs related thereto.
- b. Bonds and Insurance: Payment for bonds and insurance shall include the costs of the Performance and Payment Bonds provided under the Contract, and the premiums for insurance required under the Contract.
- c. General Requirements: Payment for General Conditions will be distributed over the initial term of the Contract and shall include field supervision and support staff, office supervision and support staff, costs associated with maintaining the field operation, and other items required by the general requirements and conditions of the Contract.
- d. Demobilization: Payment for the Contractor’s demobilization upon completion of the Project shall include all costs incurred for removing equipment and materials from the Project area and any pertinent costs related thereto.
- e. Breakdown of construction activities.

## **PART 3 - EXECUTION**

### **3.1 PAY ITEMS**

- A. The pay items listed hereinbefore refer to the items listed in the Bid Schedule and cover all of the pay items for this Contract.
- B. Any and all other items of Work listed in the Specifications or shown on the Drawings for this Contract shall be considered incidental to and included in those pay items.

### **3.2 ESTIMATED QUANTITIES OF WORK**

- A. Wherever the estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of the documents, including the Bid Proposal, they are given for use in comparing bids and the right is specifically reserved, except as otherwise limited by the Contract Documents, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the Work contemplated by this Contract. Such increase or diminution shall be accompanied by an adjustment in the Contract Amount in accordance with the Contract Conditions, and shall not give cause for claims or liability for damages against the Owner or the Engineer, due to such increase or diminution.

**END OF SECTION**

**SECTION 01030**  
**ALTERNATIVES**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. This section identifies and details work indicated on the plans or described in the specifications as an Additive, Deductive or Equipment Alternative.

**1.2 RELATED WORK**

- A. Section 09906 – Filter Bays Paint Restoration

**1.3 PERMITS AND CODE COMPLIANCE**

- A. Any permit, permit modification, code modification or submittal arising from the acceptance of any of the Alternatives will be the responsibility of the Contractor.

**1.4 SUBMITTALS**

- A. The Contractor shall provide any information requested by the Owner or Engineer in a timely manner in order to determine whether an Alternative will be accepted. The submission of shop drawings and other required information shall conform with Section 01300 of these specifications.

**PART 2 - SCHEDULE OF ALTERNATIVES**

**2.1 ADDITIVE ALTERNATIVE SCHEDULE**

- A. The Contractor shall bid as “Additive Alternate No. 1” to this Contract, all work specified or implied in technical specifications “Section 09906 – Filter Bays Paint Restoration” and depicted or implied on sheet 01D109 of the contract drawings.

**2.2 DEDUCTIVE ALTERNATIVE SCHEDULE (NOT USED)**

- A. None

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01035**  
**MODIFICATION PROCEDURES**

**PART 1 - GENERAL**

**1.1 CHANGE ORDER PROCEDURE**

- A. Change Orders shall be prepared by the Owner and reviewed by the Engineer for handling contract changes that affect Contract Price or Contract Times or both. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.
- B. Where Contract Milestones are listed in the Agreement, any effect of a Change Order thereon shall be addressed in the Change Order.
- C. Owner will initiate the process, including a description of the changes involved and attachments, based upon documents and proposals submitted by the Contractor, or requests by the Owner, or both.
- D. When the Owner has completed and signed the Change Order form, all copies will be sent to the Contractor for signature. After approval by the Contractor, all copies will be sent to the Owner for signature. Engineer shall make distribution of fully signed copies following approval and signature by both parties.
- E. Should a change order only apply to Contract Price or to Contract Times, the Owner shall cross out the part of the tabulation that does not apply.

**1.2 CHANGE ORDER FORM**

- A. The Change Order form is provided in Division 0, Section 00640.

**PART 2 - EXECUTION (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**



**SECTION 01040**  
**COORDINATION**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The Contractor shall coordinate the Work of all crafts, trades and subcontractors engaged on the Work, and shall have final responsibility in regards to the schedule, workmanship and completeness of each and all parts of the Work.
- B. The Contractor shall be prepared to guarantee to each of its subcontractors the dimensions which they may require for the fitting of their work to the surrounding work.
- C. All crafts, trades and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work which adjoins, incorporates, precedes or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to execution of subcontract agreements and the assignment of the parts of the Work. Each craft, trade and subcontractor shall be made responsible to the Contractor, for furnishing embedded items, giving directions for doing all cutting and fitting, making all provisions for accommodating the Work, and for protecting, patching, repairing and cleaning as required to satisfactorily perform the Work.
- D. The Contractor shall be responsible for all cutting, digging and other actions of its subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the Project, the Contractor shall make such repairs, alterations and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.
- E. Each subcontractor is expected to be familiar with the General Requirements and all Sections of the Detailed Specifications for all other trades and to study all Drawings applicable to its work to the end that complete coordination between the trades will be affected. Each subcontractor shall consult with the Contractor, who shall advise the Engineer if conflicts exist on the Drawings.
- F. No extra compensation will be allowed to cover the cost of removing piping, conduits, etc., or equipment found encroaching on space required by others.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01045**  
**CUTTING AND PATCHING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Provide cutting and patching work to properly complete the work of the project, complying with requirements for connection to existing lines and structures.
- B. Do not cut and patch in a manner that would result in a failure of the work to perform as intended, decreased energy efficiency, increased maintenance, reduced operational life, or decreased safety.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Match existing materials with new materials conforming to project requirements when performing cutting and patching work.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Inspect conditions prior to work to identify scope and type of work required. Protect adjacent work. Notify Owner of work requiring interruption to building services or Owner's operations.
- B. Perform work with workmen skilled in the trades involved. Prepare sample area of each type of work for approval.
- C. Cutting: Use cutting tools, not chopping tools. Make neat holes. Minimize damage to adjacent work. Check for concealed utilities and structure before cutting.
- D. Patching: Make patches, seams, and joints durable and inconspicuous. Comply with tolerances for new work.
- E. Clean work area and areas affected by cutting and patching operations.

**END OF SECTION**

**SECTION 01090**  
**REFERENCES AND ABBREVIATIONS**

**PART 1 - GENERAL**

**1.1 REQUIREMENTS INCLUDED**

- A. Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth as follows:

ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
ANS	American National Standard
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association
AWWA	American Water Works Association
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, DC
FTTP	Fort Thomas Treatment Plant
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IPS	Iron Pipe Size
NBS	National Bureau of Standards
NEC	National Electrical Code; latest edition
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NKWD	Northern Kentucky Water District
NPT	National Pipe Thread
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
Stl. WG	U.S. Steel Wire, Washburn and Moen, American Steel and Wire or Roebling Gage
125-lb. ANS;	American National Standard for Cast-Iron Pipe Flanges and
250-lb. ANS	Flanged Fittings, Designation B16.1-1975, for the appropriate class
UL	Underwriters' Laboratories

- B. Reference Standards:

1. For products or workmanship specified by association, trade or federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
2. The date of the standard is that in effect as of the Bid date, or the date of the Owner-Contractor Agreement when there are no bids, unless a certain date is indicated for the standard in the Contract Documents.
3. When required by an individual Specification section, the Prime Contractor shall obtain a copy of the standard. Maintain the copy at the job site, available for review by Owner, Engineer, Resident Representative and other appropriate parties until Substantial Completion.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01120**  
**ENVIRONMENTAL PROTECTION**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. For the purpose of this Specification, environmental protection is defined as the retention of the environment in Project construction and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air and land and involves noise as well as other pollutants. In order to prevent, and to provide for abatement and control of, any environmental pollution arising from the construction activities in the performance of this Contract, the Contractor and its subcontractors shall comply with all applicable federal, state and local laws and regulations concerning environmental pollution control and abatement. This Section covers the furnishings of all labor, materials, equipment and performing all work required for the protection of the environment during construction operations except for those measures set forth in other Sections of these specifications.

**1.2 PROTECTION OF LAND RESOURCES**

- A. The land resources within the Project boundaries and outside the limits of work performed under this Contract shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project.

**1.3 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS**

- A. In the event archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of this project, work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall not commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.

**1.4 PROTECTION OF LAND AREAS**

- A. Except for any work on storage areas and access routes specifically assigned for the use of the Contractor under this Contract, the land areas outside the limits of permanent work performed under this Contract shall be preserved in their present condition. Contractor shall confine its construction activities to areas defined for work on the plans or specifically assigned for its use. No other areas shall be used by the Contractor without written consent of the Owner.

**1.5 PROTECTION OF TREES AND SHRUBS**

- A. Reasonable care shall be taken during construction to avoid damage to vegetation.
- B. The Contractor shall not deface, injure or destroy trees or shrubs, nor remove or cut them without prior approval from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage.

**1.6 TREE PROTECTIVE STRUCTURES**

- A. Where, in the opinion of the Owner, trees may possibly be defaced, bruised, injured or otherwise damaged by the Contractor's equipment or by its other operations, Owner may direct the Contractor to provide temporary protection of such trees by placing boards, plans, or poles around them. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage.

## **1.7 RESTORATION OF DAMAGED TREES**

- A. Any tree scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. All scars made on trees shall be coated as soon as possible with an approved tree wound dressing.
- B. Trees that are to remain, either within or outside established clearing limits, that are damaged by the Contractor so as to be beyond saving in the opinion of the Owner, shall be immediately removed, if so directed, and replaced with a nursery-grown tree of the same species and size.

## **1.8 PROTECTION OF WATER RESOURCES**

- A. The Contractor shall control the disposal of fuels, oils, bitumens, calcium chloride, acids, or harmful materials, and shall comply with applicable Federal, State, County and Municipal laws concerning pollution of rivers and streams while performing work under this Contract. Special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, herbicides and insecticides from entering public waters. Water used in on-site material processing, concrete curing, foundation and concrete cleanup, and other waste waters shall not be allowed to reenter a stream if an increase in the turbidity of the stream could result therefrom.

## **1.9 BURNING**

- A. Air pollution restrictions applicable to this project are as follows: Materials shall not be burned on the premises. If the Contractor elects to dispose of waste materials off the premises, by burning, it shall make its own arrangements for such burning area and shall, as specified in the General Conditions, conform to all applicable regulations.

## **1.10 DUST CONTROL**

- A. The Contractor shall maintain all excavations, stockpiles, access roads, waste areas, and all other work free from excess dust to such reasonable degree as to avoid causing a hazard or nuisance to others. Approved temporary methods consisting of sprinkling, chemical treatment, or similar methods will be permitted to control dust. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

## **1.11 EROSION CONTROL**

- A. Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall be graded to control erosion within acceptable limits. Temporary control measures shall be provided and maintained until permanent drainage facilities are completed and operative. The area of bare soil exposed at any one time by construction operations, should be held to a minimum.

## **1.12 CORRECTIVE ACTION**

- A. The Contractor shall, upon receipt of a notice in writing of any noncompliance with the foregoing provisions, take immediate corrective action. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs of damages by the Contractor unless it was later determined that the Contractor was in compliance.

## **1.13 POST-CONSTRUCTION CLEANUP OR OBLITERATION**

- A. The Contractor shall, unless other wise instructed in writing by the Owner, obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed areas shall be graded and filled and the entire area seeded.

## **END OF SECTION**

**SECTION 01200**  
**PROJECT MEETINGS**

**PART 1 - GENERAL**

**1.1 PRECONSTRUCTION CONFERENCES**

- A. Prior to commencing the work, a preconstruction conference will be held at the job site and representatives of the following organizations shall have at least one representative in attendance:
  - 1. Owner.
  - 2. Engineer.
  - 3. Contractor.
  - 4. Major subcontractors as the Contractor may direct, or the Engineer may require upon sufficient notice.
  - 5. Representatives of the appropriate state and federal agencies as they may choose to attend.
- B. The preconstruction conference will be for the purpose of reviewing procedures to be followed concerning the orderly flow of required paperwork; coordination of the various parties involved with the project, review of Shop Drawing submittals, Contract time, liquidated damages, payment estimates, Change Orders, and other items of interest to the parties involved.

**1.2 PROGRESS MEETINGS**

- A. With the express purpose of expediting construction and providing the opportunity for cooperation of affected parties, meetings shall be called which shall be attended by representatives of (a) Owner, (b) the Engineer, (c) the Contractor, (d) all Subcontractors. A location on or near the site will be designated where such meetings will be held. The frequency of meetings shall monthly and the date and time be at the discretion of the Owner and Engineer.

**PART 2 - PRODUCTS**

**PART 3 - EXECUTION**

**END OF SECTION**

**SECTION 01300**  
**SUBMITTALS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Shop drawings, descriptive literature, project data and samples (when samples are specifically requested) for all manufactured or fabricated items shall be submitted by the Contractor to the Engineer for examination and review in the form and in the manner required by the Engineer. All submittals shall be furnished in at least three (3) copies to be retained by the Engineer and shall be checked and reviewed by the Contractor before submission to the Engineer. The review of the submittal by the Engineer shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Review of such submittal will not relieve the Contractor of the responsibility for any errors which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

**1.2 RELATED REQUIREMENTS**

- A. Section 00700 - General Conditions.  
B. Section 01720 - Project Record Documents.

**1.3 DEFINITIONS**

- A. The term "submittals" shall mean shop drawings, manufacturer's drawings, catalog sheets, brochures, descriptive literature, diagrams, schedules, calculations, material lists, performance charts, test reports, office and field samples, and items of similar nature which are normally submitted for the Engineer's review for conformance with the design concept and compliance with the Contract Documents.

**1.4 CONTRACTOR'S ULTIMATE RESPONSIBILITY**

- A. Review by the Engineer of shop drawings or submittals of material and equipment shall not relieve the Contractor from the responsibilities of furnishing same of proper dimension, size, quantity, materials and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Review shall not relieve the Contractor from responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. Review of shop drawings shall not be construed as releasing the Contractor from the responsibility of complying with the Specifications.

**1.5 GENERAL REQUIREMENTS FOR SUBMITTALS**

- A. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Documents. Where applicable, show fabrication, layout, setting and erection details. Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for its distribution plus three (3) which will be retained by the Engineer and Owner. Shop drawings shall be folded to an approximate size of 8-1/2 inch x 11 inch and in such manner that the title block will be located in the lower righthand corner of the exposed surface.



- B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the Project, and shall be supplemented to provide additional information applicable to the Project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the Project.
- C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.
- D. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable Drawing(s) or Drawing schedule(s) and shall be accompanied by transmittal forms in the format provided by the Engineer.
- E. The Contractor shall review and check submittals, and indicate its review by initials and date.
- F. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer, in letter of transmittal of the deviation and the reasons therefor. All changes shall be clearly marked on the submittal with a bold mark other than red. Any additional costs for modifications shall be borne by the Contractor.
- G. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.
- H. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.
- I. Submittals for all electrically operated items (including instrumentation and controls) shall include complete wiring diagrams showing lead, runs, number of wires, wire size, color coding, all terminations and connections, and coordination with related equipment.
- J. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.
- K. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.
- L. Where manufacturer's brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.
- M. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.
- N. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying materials and products delivered to and installed in the Project shall be saved and transmitted to the Owner through the Engineer.

## **1.6 CONTRACTOR RESPONSIBILITIES**

- A. Verify field measurements, field construction criteria, catalog numbers and similar data.
- B. Coordinate each submittal with requirements of Work and Contact Documents.
- C. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.

- D. Begin no work, and have no material or products fabricated or shipped which required submittals until return of submittals with Engineer's stamp and initials or signature indicating review.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01380**  
**CONSTRUCTION PHOTOGRAPHS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Provide monthly photographs of the construction throughout the progress of the Work.

**1.2 RELATED WORK**

- A. Section 00700 - General Conditions.
- B. Section 01700 - Project Closeout.

**1.3 CONSTRUCTION PHOTOGRAPHY**

- A. The term "photograph" as used herein refers to a photographic view, including similar exposures taken to assure the usefulness of the photographic record. All necessary photographs shall be taken to assure the usefulness of the photographic record. All photographs shall be taken in color, not black and white. All photographs shall be taken in digital format. No film permitted. Digital photography shall be submitted in .jpeg format on CD on a monthly basis at each progress meeting. Proper illumination shall be utilized to insure clear, crisp images.
- B. Provide monthly photographs (two sets) of the construction throughout the progress of the Work. Provide twenty-four (24) views of Work each month or more as may be necessary to clearly show any new work.
- C. Take the photographs as close as possible to the cutoff date for each Application for Payment, except for those photographs necessary to comply with Paragraph D., following.
- D. Take photographs at the beginning, during, and completion of each element of construction listed below:
  - 1. Demolition.
  - 2. Flocculation Improvements/Replacement.
  - 3. Clarifier Improvements/Replacement.
  - 4. Rapid mix Improvements.
  - 5. Concrete Baffle wall construction.
  - 6. Miscellaneous Concrete Repairs.
  - 7. Project Closeout

**1.4 DOCUMENTATION**

- A. Two CDs of each set of photographs shall be furnished to the Owner and Engineer with each pay request.
- B. Each CD shall have attached the following information in neat lettering:
  - 1. Project name.
  - 2. Contractor's name.
  - 3. Short Description of View.
  - 4. Photo Number and Date Taken.

**1.5 DIGITAL FILES**

- A. Digital photographs shall be provided on compact disks with label and identification requirements specified above.

## **1.6 TECHNIQUE**

- A. All views shall provide factual presentation of the Work progress.
- B. All photos shall provide correct exposure and focus, high resolution and sharpness, maximum depth of field and minimum distortion.

## **1.7 VIEWS**

- A. The photographs shall be from varied views which show the most representative examples of the Work progress.

## **1.8 PRECONSTRUCTION VIDEO**

- A. Prior to the initiation of any construction activities, the Contractor shall video the entire site, including the complete exterior of all buildings within fifty (50) feet of the edge of Construction Limits.
- B. The original of the video files shall be provided to the Owner. One (1) copy of the video files shall be provided to the Engineer. Contractor shall retain one or more copies, as necessary to meet the requirements of their insurance and bonding coverage.
- C. Maximum camera travel speed during the taping shall not exceed 5.9 feet per second (approximately 4 miles per hour). Slower camera travel speeds are recommended in and around developed areas. Addresses, stationing, or other orientation information should be provided on an audio track of the video. A typewritten index of the video shall be provided, indicating by video counter location each address, stationing number or other location identifier, to allow rapid location of specific views on the video record.
- D. A minimum of (1) flash card shall be used for documenting the existing site conditions. Videos shall be supplied in digital format on a USB flash drive or flash card of sufficient size to hold all videos taken of the project area.

## **1.9 SUBMITTALS**

- A. Submit Preconstruction Video prior to beginning site clearing activities.
- B. Submit monthly construction photograph prints with each Application for Payment.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION (NOT USED)**

### **END OF SECTION**

**SECTION 01400**  
**QUALITY CONTROL**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Work of all crafts and trades shall be laid out to lines and elevations as established by the Contractor from the Drawings or from instructions by the Engineer.
- B. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The Work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the Work carefully and neatly together.
- C. All equipment, materials and articles incorporated into the Work shall be new and of comparable quality to that specified. All workmanship shall be first-class and shall be performed by mechanics skilled at, and regularly employed in, their respective trades.
- D. The Contractor shall determine that the equipment he proposes to furnish can be brought into the facility and installed in the space available. Equipment shall be installed so that all parts are readily accessible for inspection and maintenance.

**1.2 WORKMANSHIP**

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

**1.3 MANUFACTURERS' INSTRUCTIONS**

- A. Comply with manufacturers' instructions in full detail as to shipping, handling, storing, installing, start-up and operation.

**1.4 MANUFACTURERS' FIELD SERVICES**

- A. The Contractor shall arrange for the services of qualified service representatives from the companies manufacturing or supplying each type of equipment required in the Specification sections and/or in Section 01450.
- B. The manufacturer or supplier shall provide sufficient engineering and technician manhours to satisfactorily complete Supervision of Installation, Equipment Check-out, Field Acceptance Tests, Pre-startup Operator Training, and Post-startup Services (see Section 01450).

**1.5 TESTING SERVICES**

- A. Tests, inspections and certifications of materials, of equipment, of subcontractors' work, or of completed work shall be provided by the Contractor, as required by the various sections of the Specifications, and all costs for such tests, inspections and certifications shall be included in the Contract Price.
- B. The Contractor shall submit the name of testing laboratory proposed for use on the Project to the Owner, for approval.
- C. The Contractor shall deliver written notice to the Engineer at least two (2) work days in advance of any inspections or tests to be made at the Project site. All inspections or tests to be conducted in the field shall be done in the presence of the Owner or its representative.
- D. Certifications by independent testing laboratories may be by properly attested copies of the data including scientific procedures and results of tests.

**END OF SECTION**

**SECTION 01450**  
**SERVICES OF MANUFACTURER'S REPRESENTATIVE**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. General: The Contractor shall provide a qualified service representative from each company manufacturing or supplying certain equipment to perform the duties herein described and as required by the various sections of the Specifications. All costs shall be included in the Contract price.
  - 1. The service representative shall notify the Engineer each time he intends to be at the project site, and define the purpose of this visit. There will be no acknowledgment by the Owner of on-site visits by service representatives unless such visits are properly logged by the Engineer.
- B. Supervision of Installation: Where indicated in the Specifications, the manufacturer's representative shall provide supervision of the workers and advice to the Owner to insure that proper procedures are followed during equipment installation.
- C. Equipment Check-out:
  - 1. After installation of the listed equipment has been completed and the equipment is presumably ready for operation but before it is operated by others, the representative shall inspect, operate, test and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:
    - a. Soundness (without cracked or otherwise damaged parts).
    - b. Completeness in all details as specified.
    - c. Correctness of setting, alignment and relative arrangement of various parts.
    - d. Adequacy and correctness of packing, sealing and lubricants.
  - 2. The operation, testing and adjustment shall be as required to prove that the equipment has been installed properly and is capable of satisfactory operation under the conditions specified. On completion of its work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result of its inspection, operation, adjustments and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained, if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a certificate that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
- D. Field Acceptance Tests: After the Engineer has reviewed the reports from the manufacturer's representatives, the Contractor shall make arrangements to have the manufacturer's representatives present when the field acceptance tests are made.
- E. Pre-startup Operator Training: Provision of classroom and hands-on training to maintenance personnel in the operation and maintenance of the equipment prior to placing the equipment in full operation.
- F. Post-startup Services: Provision of assistance to the Owner in the calibration, tuning and troubleshooting, plus any additional training which may be required during the year after the equipment is accepted by the Owner.
- G. The minimum required number of on-site man hours required for manufacture's representatives shall be 8-hours for all major pieces of equipment, including but not limited to, the clarifier sludge collection systems, rapid mix #1 mixer and controls, and vertical flocculation equipment and controls, unless otherwise stated.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01535**  
**PROTECTION OF INSTALLED WORK**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Protection for products, including Owner-provided products, after installation.

**1.2 RELATED REQUIREMENTS**

- A. Division 1 - General Requirements.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 PROTECTION AFTER INSTALLATION**

- A. Protect installed products and control traffic in immediate area to prevent damage from subsequent operations.
- B. Restrict traffic of any kind across planted lawn and landscape areas.

**END OF SECTION**



**SECTION 01560**  
**TEMPORARY CONTROLS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Dust control.
- B. Erosion and sediment control.

**1.2 RELATED REQUIREMENTS**

- A. None

**PART 2 - PART 2 - PRODUCTS (NOT USED)**

**PART 3 - PART 3 - EXECUTION**

**3.1 DUST CONTROL**

- A. Execute work by methods to minimize raising dust from construction operations.
- B. Provide positive means to minimize construction or traffic generated dust from dispersing into atmosphere.
- C. Provide spraying of construction traffic areas with water to hold dust leaving the construction site to the minimum amounts allowed by regulations.

**3.2 EROSION AND SEDIMENT CONTROL**

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes, drains, hay bales, gabions, etc., as directed by the Engineer or Owner so as to minimize siltation due to runoff.
- D. Construct fill and waste areas by selective placement to avoid erosive exposed surface of silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

**END OF SECTION**

**SECTION 01563**  
**DUST CONTROL**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Dust control.

**PART 2 - PART 2 - PRODUCTS (NOT USED)**

**PART 3 - PART 3 - EXECUTION**

**3.1 DUST CONTROL**

- A. Execute work by methods to minimize raising dust from construction operations.
- B. Provide positive means to minimize construction or traffic generated dust from dispersing into atmosphere.
- C. Provide spraying of construction traffic areas with water to hold dust leaving the construction site to the minimum amounts allowed by regulations.

**END OF SECTION**

**SECTION 01600**  
**MATERIAL AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 STORAGE OF MATERIALS AND EQUIPMENT**

- A. All excavated spoil, all materials and all equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

**1.2 HANDLING AND DISTRIBUTION**

- A. The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by it, until final completion and acceptance of the Work.
- B. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

**1.3 MATERIALS, SAMPLES, INSPECTION**

- A. Unless otherwise expressly provided on the Drawings or in any of the other Contract Documents, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer. No material shall be processed or fabricated for the Work or delivered to the Work site without prior concurrence of the Engineer.
- B. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor. Defective materials and equipment shall be removed immediately from the site of the Work.
- C. If the Engineer so requires, either prior to or after commencement of the Work, the Contractor shall submit samples of materials for such special tests as the Engineer deems necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed. The Contractor shall furnish suitable molds for and make the concrete test cylinders. Except as otherwise expressly specified, the Contractor shall make arrangements for, and pay for, the tests.
- D. All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, the Contractor shall notify the Engineer by letter that the samples have been shipped and shall properly describe the samples in the letter. The letter of notification shall be sent separate from and should not be enclosed with the samples.
- E. The Contractor shall submit data and samples, or place its orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences of its failure to do so shall be the Contractor's sole responsibility.

- F. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall, floor, finish, etc., as may be required.
- G. When required, the Contractor shall furnish to the Engineer triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.
- H. After review of the samples, data, etc., the materials and equipment used on the Work shall in all respects conform therewith.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01620**  
**STORAGE AND PROTECTION**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. General storage.
- B. Enclosed storage.
- C. Exterior storage.
- D. Maintenance of storage.

**1.2 RELATED REQUIREMENTS**

- A. Division 1 - General Requirements.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 GENERAL STORAGE**

- A. Store products, immediately on delivery, in accordance with manufacturer's instructions, with seals and labels intact. Protect until installed.
- B. Arrange storage in a manner to provide access for maintenance of stored items and for inspection.

**3.2 ENCLOSED STORAGE**

- A. Store products, subject to damage by the elements, in substantial weathertight enclosures.
- B. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
- C. Provide humidity control and ventilation for sensitive products as required by manufacturer's instructions.
- D. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

**3.3 EXTERIOR STORAGE**

- A. Provide substantial platforms, blocking, or skids, to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.
- B. For products subject to discoloration or deterioration from exposure to the elements, cover with impervious sheet material. Provide ventilation to avoid condensation.
- C. Store loose granular materials on clean, solid surfaces such pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
- D. Provide surface drainage to prevent erosion and ponding of water.
- E. Prevent mixing of refuse or chemically injurious materials.

### **3.4 MAINTENANCE OF STORAGE**

- A. Periodically, inspect stored products on a scheduled basis. Maintain a log of inspections, make available to Owner and Engineer on request.
- B. Verify that storage facilities comply with manufacturer's product storage requirements.
- C. Verify that manufacturer required environmental conditions are maintained continually.
- D. Verify that surfaces of products exposed to the elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.

### **3.5 MAINTENANCE OF EQUIPMENT STORAGE**

- A. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions to accompany each item, with notice of enclosed instructions shown on exterior of package.
- B. Service equipment on a regularly scheduled basis, in accordance with the manufacturer's recommendations, maintaining a log of services; submit as a record document.

**END OF SECTION**

**SECTION 01700**  
**PROJECT CLOSEOUT**

**PART 1 - GENERAL**

**1.1 RELATED REQUIREMENTS**

- A. Section 00700 - General Conditions.
- B. Section 01710 - Cleaning.
- C. Section 01720 - Project Record Documents.

**1.2 SUBSTANTIAL COMPLETION**

- A. Contractor:
  - 1. Submit written certification to Owner that project is substantially complete.
  - 2. Submit list of major items to be completed or corrected.
- B. Engineer will make an inspection within seven days after receipt of certification, together with the Owner's representative.
- C. Should Engineer consider that work is substantially complete:
  - 1. Contractor shall prepare, and submit to Engineer, a list of the items to be completed or corrected, as determined by on-site observation.
  - 2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:
    - a. Date of Substantial Completion.
    - b. Contractor's list of items to be completed or corrected, verified and amended by Engineer.
    - c. The time within which Contractor shall complete or correct work of listed items.
    - d. Time and date Owner will assume possession of work or designated portion thereof.
    - e. Responsibilities of Owner and Contractor for:
      - 1) Insurance.
      - 2) Utilities.
      - 3) Operation of mechanical, electrical and other systems.
      - 4) Maintenance and cleaning.
      - 5) Security.
    - f. Signatures of:
      - 1) Engineer.
      - 2) Contractor.
      - 3) Owner.
  - 3. Contractor: Complete work listed for completion or correction, within designated time.
- D. Should Engineer consider that work is not substantially complete:
  - 1. Owner shall immediately notify Contractor, in writing, stating reasons.
  - 2. Contractor: Complete work, and send second written notice to Engineer, certifying that Project, or designated portion of project is substantially complete.
  - 3. Engineer will re-review work.

**1.3 FINAL INSPECTION**

- A. Contractor shall submit written certification that:
  - 1. Contract Documents have been reviewed.
  - 2. Project has been inspected for compliance with Contract Documents.
  - 3. Work has been completed in accordance with Contract Documents.
  - 4. Equipment and systems have been tested in presence of Owner's representative and are operational.

5. Project is completed and ready for final inspection.
- B. Engineer will make final on-site observation/review within seven (7) days after receipt of certification.
- C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.
- D. Should Engineer consider that work is not finally complete:
  1. Owner shall notify Contractor, in writing, stating reasons.
  2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
  3. Engineer will re-review the work.

#### **1.4 FINAL CLEANING UP**

- A. The work will not be considered as completed and final payment made until all final cleaning up has been done by the Contractor in a manner satisfactory to the Engineer. See Section 01710 for detailed requirements.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Project Record Documents: to requirements of Section 01720.
- B. Operation and Maintenance Data: to requirements of particular technical specifications and Section 01730.
- C. Warranties and Bonds: to requirements of particular technical specifications and Section 01740.

#### **1.6 INSTRUCTION**

- A. Instruct Owner's personnel in operation of all systems, mechanical, electrical and other equipment.

#### **1.7 FINAL APPLICATION FOR PAYMENT**

- A. Contractor shall submit final applications in accordance with requirements of General Conditions.

#### **1.8 FINAL CERTIFICATE FOR PAYMENT**

- A. Engineer will issue final certificate in accordance with provisions of General Conditions.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-final Certificate for payment.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**



## **SECTION 01710 CLEANING**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.
- B. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

#### **1.2 RELATED REQUIREMENTS**

- A. Section 01045 - Cutting and Patching.
- B. Section 01700 - Project Closeout.
- C. Cleaning for Specific Products or Work: Specification Section for that work.

#### **1.3 SAFETY REQUIREMENTS**

- A. Hazards control:
  - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
  - 2. Prevent accumulation of wastes which create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - 1. Do not burn or bury rubbish and waste materials on Project site without written permission from the Owner.
  - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 3. Do not dispose of wastes into streams or waterways.

### **PART 2 - PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

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

### **PART 3 - EXECUTION**

#### **3.1 DURING CONSTRUCTION**

- A. Execute cleaning to ensure that building, grounds and public properties are maintained free from accumulations of waste materials, trash, and rubbish.
- B. Wet down dry materials and rubbish to allay dust and prevent blowing dust.
- C. At reasonable intervals during progress of Work, clean site and public properties. Provide on-site containers for collection of waste materials, debris, trash, and rubbish.

- D. Remove waste materials, debris, trash, and rubbish from site when containers are full, or when directed by the Engineer or Owner's representative, but not less often than once weekly. Legally dispose of all waste materials, debris, trash, and rubbish at dumping areas off of Project site.
- E. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- F. The Contractor shall thoroughly clean all materials and equipment installed.

### **3.2 FINAL CLEANING**

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion, conduct final inspection of sight-exposed interior and exterior surface, and of concealed spaces.
- C. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- D. Broom clean paved surfaces; rake clean other surfaces of grounds.
- E. Maintain cleaning until Project, or portion thereof, is occupied by Owner.
- F. The Contractor shall restore or replace existing property or structures as promptly and practicable as work progresses.

**END OF SECTION**

**SECTION 01720**  
**PROJECT RECORD DOCUMENTS**

**PART 1 - GENERAL**

**1.1 RELATED REQUIREMENTS**

- A. Section 00700 - General Conditions.
- B. Section 01300 - Submittals.

**1.2 MAINTENANCE OF DOCUMENTS**

- A. Maintain at job site, one copy of:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Reviewed Shop Drawings.
  - 5. Change Orders.
  - 6. Other Modifications to Contract.
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

**1.3 MARKING DEVICES**

- A. Provide colored pencil or felt-tip marking pen for all marking.

**1.4 RECORDING**

- A. Label each document "RECORD DRAWING" in 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
  - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - 3. Field changes of dimension and detail.
  - 4. Changes made by Change Order or Field Order.
  - 5. Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each Section to record:
  - 1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed.
  - 2. Changes made by Change Order or Field Order.
  - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

## **1.5 SUBMITTAL**

- A. At completion of project, deliver record documents to Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Contractor's name and address.
  - 4. Title and number of each record document.
  - 5. Certification that each document as submitted is complete and accurate.
  - 6. Signature of Contractor or its authorized representative.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01730**  
**OPERATING AND MAINTENANCE DATA**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Compile product data and related information appropriate for Owner's maintenance and operation of equipment furnished under the contract. Prepare operating and maintenance data as specified.
- B. Instruct Owner's personnel in the maintenance and operation of equipment and systems as outlined herein.
- C. In addition to maintenance and operations data, the manufacturer's printed recommended installation practice shall also be included. If not part of the operations and maintenance manual, separate written installation instructions shall be provided, serving to assist the Contractor in equipment installation.

**1.2 RELATED REQUIREMENTS**

- A. Section 00700 - General Conditions.
- B. Section 01300 - Submittals.
- C. Section 01720 - Project Record Documents.
- D. Section 01740 - Warranties and Bonds.

**1.3 MAINTENANCE AND OPERATIONS MANUAL**

- A. Every piece of equipment furnished and installed shall be provided with the following maintenance and operations manuals:
  - 1. One (1) copy in electronic format, on compact disk, furnished for the Engineer's review as to adequacy and completeness. Preferred electronic format is .pdf file. Following review, the Contractor shall cause any changes required to be made, and shall store all manuals until the completion of the project or until requested by the Engineer. The manuals will be stored and delivered to the Engineer, organized as described in this specification.
  - 2. Two (2) final copies, with all required changes, in print format, furnished to the Owner.
  - 3. Four (4) final copies, with all required changes, on compact disk. Two (2) copies furnished to Owner, two (2) copies furnished to Engineer. Format shall be .pdf file.
- B. The final form of the manuals shall be utilized in instructions of the Owner's personnel.

**1.4 FORM OF SUBMITTALS**

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Format for hard copies:
  - 1. Size: 8-1/2 x 11 in.
  - 2. Paper: 20 pound minimum, white, for typed pages.
  - 3. Text: Manufacturer's printed data, or neatly typewritten.
  - 4. Drawings:
    - a. Provide reinforced punched binder tab, bind with text.
    - b. Fold large drawings to the size of the text pages where feasible.
    - c. For all drawings included within manuals, furnish a 8 mil Mylar copy in standard size drawings 36" x 24", 8" x 16" or 8-1/2" x 11".
    - d. For flow or piping diagrams that cannot be detailed on the standard size drawings, a larger, appropriate size drawing may be submitted.

5. Provide fly-leaf for each separate product, or each piece of operating equipment.
    - a. Provide typed description of product, and major component parts of equipment.
    - b. Provide indexed tabs.
  6. Cover: Identify each volume with types or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
    - a. Title of Project.
    - b. Identity of separate structure as applicable.
    - c. Identity of general subject matter covered in the manual.
- C. Binders:
1. Commercial quality, durable and cleanable, 3-hole, 3" or 4" post type binders, with oil and moisture resistant hard covers.
  2. When multiple binders are used, correlate the data into related consistent grouping.
  3. Labeled on the front cover and side of each binder shall be the name of the Contract, the Contract Number and Volume Number.

## 1.5 CONTENT OF MANUAL

- A. Neatly typewritten table of contents for each volume, arranged in systematic order.
1. Contractor, name of responsible principal, address and telephone number.
  2. A list of each product required to be included, indexed to the content of the volume.
  3. List, with each product, the name, address and telephone number of:
    - a. Subcontractor or installer.
    - b. Maintenance contractor, as appropriate.
    - c. Identify the area of responsibility of each.
    - d. Local source of supply for parts and replacement.
  4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- B. Product Data:
1. Include only those sheets which are pertinent to the specific product. References to other sizes and types or models of similar equipment shall be deleted or lined out.
  2. Annotate each sheet to:
    - a. Clearly identify the specific product or part installed.
    - b. Clearly identify the data applicable to the installation.
    - c. Provide a parts list for all new equipment items, with catalog numbers and other data necessary for ordering replacement parts.
    - d. Delete references to inapplicable information.
  3. Clear and concise instructions for the operation, adjustment, lubrication, and other maintenance of the equipment including a lubrication chart.
- C. Drawings:
1. Supplement product data with drawings as necessary to clearly illustrate:
    - a. Relations of component parts of equipment and systems.
    - b. Control and flow diagrams.
  2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
  3. Do not use Project Record Documents as maintenance drawings.
- D. Written text, as required to supplement product data for the particular installation:
1. Organize in a consistent format under separate headings for different procedures.
  2. Provide a logical sequence of instructions for each procedure.
- E. Copy of each warranty, bond and service contract issued: Provide information sheet for Owner's personnel.
1. Proper procedures in the event of failure.
  2. Instances which might affect the validity of warranties or bonds.

- F. The electronic copies of the manuals shall be submitted to the Engineer for review at the same time that the equipment to which it pertains is delivered at the site. The manuals must be approved by the Engineer before final payment on the equipment is made.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01740**  
**WARRANTIES AND BONDS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when required.
- D. Review submittals to verify compliance with Contract Documents.

**1.2 RELATED REQUIREMENTS**

- A. Performance and Payment Bonds.
- B. Guaranty.
- C. General Warranty of Construction.
- D. Warranties and Bonds required for specific products: As listed in other Specification sections.

**1.3 WARRANTY BONDS OR CORPORATE GUARANTEES IN LIEU OF EXPERIENCE RECORD**

- A. When specifically requested in the products and installation general provisions of a Specification section for a particular piece of equipment or product, a record of five (5) years of successful full-scale operation shall be required from the equipment manufacturer. This record of full-scale operation shall be from existing facilities utilizing the equipment or product specified, in an application similar to the application intended for this Project.
- B. The manufacturer shall certify in writing to the Contractor that it has the required record of successful full-scale operation. This certification shall be submitted by the Contractor with its construction materials and/or equipment data list. In the event the manufacturer cannot provide the five (5) year certification of experience to the Contractor, the Contractor shall furnish within thirty (30) days after the Notice of Award, a Warranty Bond or Corporation Guarantee from the equipment manufacturer written in the name of the Contractor and acceptable to the Owner. The Warranty Bond or Corporate Guarantee shall be kept in force for five (5) years from the Date of Substantial Completion of the Contract less the number of years of experience the manufacturer may be able to certify to the Engineer. As a minimum, the Bond or Guarantee shall be in force for one (1) year after the Date of Substantial Completion of the Contract. The Warranty Bond shall be written in an amount equivalent to the manufacturer's quotation, the Contractor's installation cost plus 100 percent (100%). The Warranty Bond or Corporate Guarantee will assure the Owner that, if in the judgment of the Engineer, the equipment does not perform its specified function, the Contractor shall remove the equipment and install equipment that will perform the specified function and the work by the Contractor shall be paid for by the Warranty Bond or Corporate Guarantee.

**1.4 SUBMITTALS REQUIREMENTS**

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Furnish two (2) original signed copies.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.



1. Product, equipment or work item.
2. Firm name, address and telephone number.
3. Scope.
4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service and maintenance contract.
6. Provide information for Owner's personnel:
  - a. Proper procedure in case of failure.
  - b. Instances which might affect the validity of warranty or bond.
7. Contractor name, address and telephone number.

#### **1.5 FORM OF SUBMITTALS**

- A. Prepare in duplicate packets.
- B. Format:
  1. Size 8 1/2-inch x 11 inches, punch sheets for 3-ring binder: Fold larger sheets to fit into binders.
  2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS".  
List:
    - a. Title of Project.
    - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

#### **1.6 TIME OF SUBMITTALS**

- A. For equipment or component parts of equipment put into service during progress of construction: Submit documents within ten (10) days after inspection and acceptance.
- B. Otherwise, make submittals within ten (10) days after date of substantial completion, prior to final request for payment.
- C. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing the date of acceptance as the start of the warranty period.

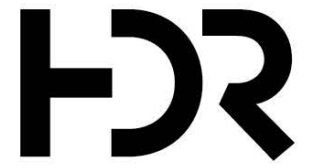
#### **1.7 SUBMITTALS REQUIRED**

- A. Submit warranties, bonds, service and maintenance contracts as specified in the respective sections of the Specifications. Additionally, the Contractor shall warrant the entire contract, including all concrete, paving, building, plumbing, HVAC, mechanical and electrical equipment to be free from defects in design and installation for one (1) year from the date of startup. In the event a component fails to perform as specified or is proven defective in service during the warranty period, the Contractor shall repair the defect without cost to the Owner.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**



D I V I S I O N 2

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Site Work

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**SECTION 02051**  
**DEMOLITION, MODIFICATIONS, AND SALVAGE**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment and incidentals required and demolish, modify, remove and dispose of work shown on the Drawings and as specified herein.
- B. Included, but not limited to, are demolition, modifications and removal of existing materials, equipment or work necessary to install the new work as shown on the Drawings and as specified herein and to connect with existing work in approved manner.
- C. Demolition, modifications and removals which may be specified under other Sections shall conform to requirements of this Section.
- D. Comply with applicable laws, codes, ordinances and regulations. Obtain and pay for necessary permits.
- E. Remove from site and legally dispose of dismantled materials, trash, debris, etc., except any items specifically indicated to be re-used or salvaged as described below.
- F. The Contractor shall visit the sites of the work and examine the premises so as to fully understand all of the existing conditions relative to the work. Contractor may visit the sites without notification to the Owner, provided Contractor remains within construction limits shown on the plans and remains outside existing fences. Contractor will need to contact the Owner in order to gain vehicular access to the project area.

**1.2 RELATED WORK**

- A. Summary of Work is included in Section 01010.
- B. Construction Sequence is included in Section 01015.
- C. Submittals are included in Section 01300.
- D. Environmental Protection is included in Section 01120.

**1.3 SUBMITTALS**

- A. Contractor shall coordinate respective selective demolition work between trades.
- B. Submit to the Engineer, in accordance with Section 01300, six copies of proposed methods and operations of demolition of the structures and modifications prior to the start of work. Include in the schedule the coordination of shutoff, capping and continuation of utility service as required.
- C. Furnish a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations. Sequence shall be compatible with sequence of construction and shutdown coordination requirements as specified in Section 01015.
- D. Before commencing demolition work, all modifications necessary to bypass the affected structure shall be completed. Actual work shall not begin until the Engineer has inspected and approved the modifications and authorized commencement of the demolition work in writing.
- E. The Contractor shall prepare a plan for the demolition work prior to commencing demolition work of this Contract and submit this sequence and schedule for demolition, indicate which items of equipment or facilities must be maintained in service and indicate also all items of equipment and materials which are to be salvaged for reuse. Demolition work plan shall identify related demolition and salvage work by other trades to avoid conflicts.

## **1.4 JOB CONDITIONS**

- A. Protection:
  - 1. The Contractor is cautioned to exercise great care in protecting existing structures and property of the Owner while proceeding with work of this Section and the entire Contract. All damage shall be repaired at once to the satisfaction of the Owner. All such repairs shall be at the expense of the Contractor and no claims for additional payment will be accepted.
  - 2. Execute the demolition and removal work to prevent damage or injury to structures, occupants thereof and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.
  - 3. Closing or obstructing of roadways, sidewalks and passageways adjacent to the work by the placement or storage of materials will not be permitted and all operations shall be conducted with a minimum interference to traffic on these ways.
  - 4. Erect and maintain barriers, lights, sidewalk sheds and other required protective devices.
- B. Scheduling: Carry out operations so as to avoid interference with operations and work in the existing facilities.
- C. Notification: At least 7 days prior to commencement of a demolition or removal, notify the Owner in writing of proposed schedule therefor. No removals shall be started without the permission of the Owner.
- D. Conditions of Structures:
  - 1. The Owner and the Engineer assume no responsibility for the actual condition of the structures to be demolished or modified.
  - 2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practical. However, variations within a structure may occur prior to the start of demolition work.
- E. Repairs to Damage: Promptly repair damage caused to adjacent facilities by demolition operation when directed by Engineer and at no cost to the Owner. Repairs shall be made to a condition at least equal to that which existed prior to construction.
- F. Traffic Access:
  - 1. Conduct demolition and modification operations and the removal of equipment and debris to ensure minimum interference with roads, streets, walks both onsite and offsite and to ensure minimum interference with occupied or used facilities.
  - 2. Special attention is directed towards maintaining safe and convenient access to the existing facilities by Owner's personnel and vehicles.
  - 3. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the Engineer. Furnish alternate routes around closed or obstructed traffic in access ways.

## **1.5 SALVAGEABLE MATERIALS**

- A. All equipment shall be demolished (non-salvaged) unless listed below in Paragraph B. for salvage. Salvaged equipment shall be carefully removed by the Contractor without damage and shall be properly transported by the Contractor to designated storage area(s) located at 2835 Crescent Springs Road, Erlanger, KY 41018. The Owner reserves the right to salvage other equipment at the Owner's expense, as coordinated with the Contractor(s). The Contractor shall properly dispose of all demolished (non-salvaged) equipment and materials off-site.
- B. Owner reserves the right to first refusal of all demolished materials, equipment, and electrical components. Contractor shall coordinate with Owner during demolition process. At this time it is not anticipated that any materials, equipment, and electrical items are desired to be salvaged.

**END OF SECTION**

**SECTION 02610**  
**WATER PIPE AND FITTINGS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The Contractor shall furnish all labor, material, and equipment necessary to install water main piping together with all appurtenances as shown and detailed on the Drawings and specified herein.

**1.2 RELATED WORK**

- A. Section 02640 - Water Valves and Gates.

**PART 2 - PRODUCTS**

**2.1 DUCTILE IRON PIPE (DIP) AND FITTINGS**

- A. Ductile iron pipe (DIP) shall conform to ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51 Standard. The pipe shall conform to pressure class 350 minimum unless noted otherwise. All fittings and joints should be capable of accommodating pressure of not less than 250 psi.
- B. Fittings shall be ductile iron in accordance with AWWA C153 and have a body thickness and radii of curvature conforming to ANSI A21.10 or ANSI A21.53 for compact fittings and shall conform to the details and dimensions shown therein. Fittings shall have rubber gasket joints meeting the requirements of AWWA C111. Fittings shall be cement-mortar lined and bituminous coated to conform to the latest revision of ANSI/AWWA standards.
- C. Ductile iron flanged joint pipe shall conform to ANSI/AWWA C115/A 21.15 Standard and have a thickness Class of 53. The pipe shall have a rated working pressure of 250 psi with Class 125 flanges. Gaskets shall be ring gaskets with a thickness of 1/8 inch. Flange bolts shall conform to ANSI B 16.1.
- D. Flanged fittings shall meet all requirements of ANSI/AWWA C110/A21.10 (or A21.53 for compact fittings) and have Class 125 flanges. Fittings shall accommodate a working pressure up to 250 psi and be supplied with all accessories.
- E. Ductile iron mechanical joint fittings shall be in accordance with AWWA C153 and have a body thickness and radii of curvature conforming to ANSI A21.10 (or A21.53 for compact fittings) and have joints in accordance with ANSI/AWWA C111/A21.11. Fittings and joints shall be supplied with all accessories.
- F. All ductile fittings shall be rated at 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grade 70-50-05 per ASTM Specification A339-55.
- G. Cement mortar lining and seal coating for pipe and fittings, where applicable shall be in accordance with ANSI/AWWA C104/A21.4. Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 for fittings.
- H. No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor, during the bidding phase, shall determine the number of fittings required on the job and include the cost of the fittings and installation in its lump sum price for the project.

- I. Ductile iron pipe and fittings shall be as manufactured by U.S. Pipe & Foundry Company, American Cast Iron Pipe Company, or approved equivalent.

## **2.2 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS**

- A. Polyvinyl chloride (PVC) pipe for water mains shall be Class 200 (SDR 21) or Class 250 (SDR 17) PVC pressure rated pipe with either twin gasket joints or integral bell joints with rubber O-ring seals. All class 200 pipe shall meet the requirements of SDR 21 and all class 250 pipe shall meet the requirement of SDR 17.
- B. All PVC pipe shall conform to the latest revisions of ASTM D-1784 (PVC Compounds), ASTM D-2241 (PVC Plastic Pipe, SDR), and ASTM D-2672 (Bell-end PVC Pipe). PVC pipe shall have a minimum cell classification of 12454B or 12454C as defined in ASTM D-1784. Rubber gasketed joints shall conform to ASTM D-3139. The gaskets for the PVC pipe joint shall conform to ASTM F-477 and D-1869.
- C. Fittings for all lines 4 inches in diameter or larger shall be ductile iron and in accordance with AWWA C153 and have a body thickness and radii of curvature conforming to ANSI A21.10 or ANSI A21.53 for compact fittings. Cement mortar lining and seal coating shall be in accordance with ANSI/AWWA C104/A21.4. Bituminous outside coating shall be in accordance with ANSI/AWWA C110/A21.10. All fittings shall be rated at 250 psi water working pressure plus water hammer and be ductile cast-iron grade 70-50-05 per ASTM Specification A339.
- D. Fittings for all lines less than 4 inches in diameter shall be PVC gasketed push-on type or socket glue-type manufactured specifically for the pipe class being utilized. All socket-glue type connections shall be joined with PVC solvent cement conforming to ASTM D2564. Product and viscosity shall be as recommended by the pipe and fitting manufacturer to assure compatibility. Solvent cement joints shall be made up in accordance with the requirements of ASTM D2855. Appropriate thrust blocks shall be provided for the fittings.
- E. No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor during the bidding phase shall determine the number of fittings required and include the cost of the fittings and installation in its lump sum price for the project.
- F. Rubber gasket joints shall provide adequate expansion to allow for a 50 degree change in temperature on one length of pipe. Lubrication for rubber connected couplings shall be water soluble, non-toxic, be non-objectionable in taste and odor and have no deteriorating affect on the PVC or rubber gaskets and shall be as supplied by the pipe manufacturer.
- G. All pipe and couplings shall bear identification markings that will remain legible during normal handling, storage and installation, which have been applied in a manner what will not reduce the strength of the pipe or the coupling or otherwise damage them. Pipe and coupling markings shall include the nominal size and OD base, material code designation, dimension ratio number, ASTM Pressure Class, ASTM designation number for this standard, manufacturer's name or trademark, seal (mark) of the testing agency that verified the suitability of the pipe material for potable-water service. Each marking shall be applied at intervals of not more than 5 feet for the pipe and shall be marked on each coupling.

## **2.3 POLYVINYL CHLORIDE (PVC) FLANGED PIPE AND FITTINGS**

- A. Polyvinyl chloride (PVC) pipe for exposed installation shall be Schedule 80, Type IV, Grade 1, conforming to ASTM D1785.
- B. PVC fittings shall be Schedule 80 conforming to the requirements of ASTM D2467 for socket type and ASTM D2464 for threaded type.
- C. Joints shall be socket-weld, except where connecting to unions, valves, and equipment with threaded or flanged connections that require future disassembly.

- D. Where required, flanges shall be 125-pound standard drilling. Gaskets shall be full-faced 1/8-inch thick, fabricated from neoprene. When mating flange has a raised face, use flat ring gasket and provide filler gasket between OD of raised face and flange OD to protect flange from bolting moment. Bolts, nuts and washers for flange connections shall be stainless steel.
- E. All socket-weld connections shall be joined with PVC solvent cement conforming to ASTM D2564. Product and viscosity shall be as recommended by the pipe and fitting manufacturer to assure compatibility.
- F. Solvent cement joints shall be made up in accordance with the requirements of ASTM D2855.
- G. Thread lubricant for threaded fittings shall be Teflon tape.

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 02640**  
**WATER VALVES AND GATES**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The Contractor shall furnish all labor, material, and equipment necessary to install valves together with all appurtenances as shown and detailed on the Drawings and specified herein.

**1.2 RELATED WORK**

- A. Section 02610 - Water Pipe and Fittings.

**1.3 SUBMITTALS**

- A. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer in accordance with the requirements of Section 01300.
- B. The manufacturer shall furnish the Engineer two (2) copies of an affidavit stating that the valve and all materials used in its construction conform to the applicable requirements of the latest revision of the applicable AWWA Standard, and that all tests specified therein have been performed and that all test requirements have been met.
- C. The Engineer shall be furnished two (2) copies of an affidavit that the "Valve Protection Testing" has been done and that all test requirements have been met.
- D. The Engineer shall be furnished with two (2) copies of an affidavit that inspection, testing and rejection are in accordance with the latest revision of the applicable AWWA Standard.

**PART 2 - PRODUCTS**

**2.1 GATE VALVES**

- A. All gate valves shall be of the resilient seat type in accordance with the latest revision of AWWA C509 Standard. The valve body, bonnet and gate castings shall be ductile iron or cast iron. The valve shall have a non-rising stem (NRS), fully bronze mounted or stainless steel with o-ring seals. Valve body and bonnet, inside and out, shall be fully coated with fusion bonded epoxy coating in accordance with AWWA C550 Standard. Valves shall have a rated working pressure of 200 psi.
- B. Gate valves for buried service shall be furnished with mechanical joint end connections, unless otherwise shown on the Drawings or specified herein. The end connection shall be suitable to receive ductile iron or PVC pipe.
- C. Gate valves for meter pits, pump stations, or other installations as shown on the Drawings shall be furnished with flanged joint and connections, outside screw and yoke and handwheel operator. The gate valve shall have the direction of opening cast on the rim of the handwheel and provided with chain and lock.
- D. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.
- E. Buried service gate valves shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counterclockwise).



- F. Buried service gate valves shall be installed in a vertical position with valve box as detailed on the Drawings. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.
- G. All gate valves installed within flocculation zone(s) shall be equipped with stainless steel stem extensions, stem supports (per manufacturer), cast iron or equal pedestal, and handwheel operator. All hardware and fasteners for stem extension shall be 316 stainless steel.
- H. Valves shall be those manufactured by Mueller, M & H Valve Company, American or approved equal.

**2.2 BUTTERFLY VALVES (NON-BURIED)**

- A. The valves shall be butterfly-type supplied with heavy-duty electric operators. A given item shall consist of a valve body and a valve operator as defined below.
- B. Valve Bodies:
  - 1. The butterfly valves to be supplied shall conform to the following specifications.
  - 2. Butterfly valves to be supplied shall be of the lug body style suitable for use with ANSI 125 or 150 pound flanges. Bodies shall be cast iron. Valves shall be rated 175 psi and provide driptight shutoff at differentials up to 175 psi.
  - 3. Lug body valves shall have a retained seat and shall provide tight shutoff up to the full valve rating on dead end or isolation service without the use of downstream flanges.
  - 4. All valves shall be furnished with self-lubricated bearings of TFE coated stainless steel. Shaft seals shall be provided to prevent leakage and to protect bearings from internal or external corrosion.
  - 5. Seats shall be of the reinforced resilient type and shall be field replaceable. Seats shall also act as a body liner to prevent flow from contacting the body casting. Seats shall have flange sealing lips to provide a positive seal without use of flange gaskets. Seats shall be of Neoprene or Hycar. Shafts shall be one piece and shall be of 316 stainless steel. Shaft diameter shall meet the 75B standard from AWWA specification C504 latest revision for butterfly valves. Shafts shall be finish ground and polished to minimize bearing and shaft seal wear. Shafts of 8-inch and larger valves shall have a non-adjustable thrust collar.
  - 6. Discs shall be cast iron with welded nickel edge. The disc-to-shaft connections shall be type 316 stainless steel. Pins, shaft and disc of all valves shall be individually machined and completely interchangeable.
  - 7. Valves shall be DeZurik (Sartell, MN), or approved equal.
- C. Electric Operators:
  - 1. The valve operators to be supplied shall conform to the following specifications.
  - 2. The valve operators are to be manufactured by Auma Actuators, Inc. (Canonsburg, PA), or approved equal and shall consist of motor, gearing, limit switches, torque switches, hand wheel, control electrical connections, motor electrical connection and related components as outlined below.
- D. Enclosures:
  - 1. All motors, gearing, switches, wiring terminals and electrical connections shall be completely sealed against the environment and protected against the ingress of water, humidity and dust.
  - 2. Enclosure shall be O-ring sealed at all interfaces and rated NEMA-4.
  - 3. Bolts on all covers shall be captured to prevent loss when disconnected. Switches (limit and torque) shall be NEMA4 so that no dirt, dust, water, etc. may interfere with the contacts when limit switch compartment cover is removed.
- E. Drive Motor:
  - 1. Drive motor shall be of sufficient size to open or close valve against maximum differential pressure when voltage to the motor terminals is 90% of nameplate rating.
  - 2. Drive motor shall be specifically designed for operator service.

3. Motor shall be totally enclosed, non-ventilated construction with permanently lubricated ball bearings.
  4. Insulation shall be Class F, tropicalized and suitable for temperatures of up to 310°F.
  5. Motor shall be of the thermally protected type.
  6. Motor shall have at least two (2) thermal switches embedded in motor windings to insure safe motor shutdown during high current draw/high temperature condition.
  7. Motor shall be capable of starting against the rated load.
  8. Motor housing shall be aluminum die cast with cooling fins.
  9. Motor nameplate shall be in accordance with NEMA standard MG1.
  10. Motor shall be name plate rated for operation on 208 V, 3-PH, 60 Hz current.
- F. Travel Limit Switches:
1. Operator shall be equipped with travel limit switches for the purpose of de-energizing the drive motor at variable, adjustable open and closed positions.
  2. Limit switch shall be of the double pole, double throw, double break type.
  3. A minimum of eight (8) silver contacts rated at 10A at 115VAC shall be provided for each operator (2 N.O., 2 N.C. for opening and 2 N.O., 2 N.C. for closing).
  4. Limit switch drive to be of counter gear design consisting of bronze gearing of the intermediate open type and shall be in step with the operator input drive in both the motor drive and manual (hand wheel) modes. (Cam operated limit switches not acceptable).
  5. Limit switches and the limit switch drive mechanism shall be an integral part of the operator.
  6. Limit switches shall be so designed that they can be adjusted to change state at any point between or beyond the fully open and fully closed positions.
  7. Limit switch assembly to have easy set declutch, so tripping cam can be rotated with no more than 10 revolutions of the cam screw.
  8. All contacts on the limit switch assembly to be sealed in NEMA-4 closures to maintain the integrity of the contacts, eliminate shorting out and prohibit personal injury while setting limits.
  9. Limit switch compartment to have no exposed electrical connections.
  10. Limit switch adjusting shall be clearly marked as to direction of turn to adjust.
- G. Torque Switches:
1. Each operator shall have an opening torque switch and a closing torque switch. Torque switches shall have a range of adjustment and be responsive to opening or closing loads such that switches operate to protect valve and operator from damage when there is a valve obstruction or overload during opening or closing.
  2. Torque switch to be calibrated and directly readable in torque units.
  3. All contacts to be sealed to insure the integrity of the contacts, eliminate shorting out, and prohibit personal injury while adjusting.
  4. Torque switches shall be of the single pole, single throw, double break type with contacts rated 10A at 115VAC.
  5. The adjusting range of torque switches shall be blocked to prevent stalling of the motor.
  6. All travel limit and torque switches shall have a manual trip knob to test phase rotation for the purpose of preventing damage to the valve.
- H. Position Indication:
1. A continuous reading mechanical dial position indicator shall be furnished as an integral part of the actuator to indicate valve position.
  2. Provision shall be made to furnish a feedback potentiometer or LVDT as required.
- I. Gearing:
1. All gearing shall be designed to withstand without failure the stall torque of the motor.
  2. The final drive shall be of the self-locking worm and wheel type to prevent creeping of the valve disc in intermediate position.
  3. Gear boxes to be of cast iron construction and completely filled with lubricant, allowing operator to be installed in any position.

- J. Drive Nut:
  1. The drive nut shall be separable from the gear assembly to facilitate rapid mounting of the operator on the valve.
  2. Drive nut shall be splined to allow mounting on the valve at 90° intervals in order that the valve/operator combination can be mounted to minimize interference with adjacent facilities and equipment.
- K. Mechanical Stops:
  1. Stops shall be furnished to mechanically restrict the movement of the valve disc from passing through the seat.
  2. The stops shall be adjustable from 80 to 120° in order that accurate seating can be achieved.
- L. Hand Wheel:
  1. A permanently attached hand wheel shall be furnished to allow manual operation of the operator.
  2. The hand wheel shall not turn operation and the motor shall not turn during hand wheel operation. A fused motor shall not prevent manual operation.
- M. Remote Mounted Actuator Control:
  1. All electric actuators shall be equipped with actuator control umbilical cord assemblies with a minimum of 30 feet of cord to allow for mounting of the control unit consisting of the circuit boards, reversing contactors, transformers, and power supplies at a location in which it is operator maintenance friendly. The operator shall be able to set limit switches and perform preliminary diagnostic work from the remote mounted controls.

### **2.3 BALL VALVES**

- A. Ball valves shall have double union ends to permit removal of the valve without disconnecting the pipeline and shall be of the type which will not leak when the downstream union end is disconnected.
- B. Viton "O" ring seals shall be used with Teflon seats. Ball valves shall be installed with the flow arrow pointed in the direction of flow to permit disconnection of downstream piping.
- C. During installation, the valve handle shall be oriented for ease of operation by rotating the valve body about its axis prior to tightening the ends.
- D. Where indicated on the Drawings, the valve shall be equipped with a pointer and scale plate which will indicate the position of the valve at all times.

### **2.4 PLUG VALVES**

- A. Plug valves shall conform to the latest revision of AWWA C517 and shall be of the nonlubricated eccentric type with resilient plugs faced with natural or synthetic rubber suitable for service in sewage and sludge piping.
- B. Port areas shall be unobstructed when open and have smoothly shaped waterways of not less than 80 percent (80%) of full pipe area except that valves 30 in. and larger shall have only 70 percent (70%) area.
- C. Bodies shall be of semisteel, suitable for 125-pound working water pressure and shall have raised seats.
- D. Valves 3 inches and larger shall have seats of a welded in overlay of not less than 90 percent (90%) pure nickel or other acceptable material.
- E. Valves less than 3 inches shall have plastic-covered seats.
- F. Valves shall have permanently lubricated upper and lower stainless steel bushings on plug journal ends.

- G. Valves shall have bolted bonnets. Valves 4 inches and larger shall be designed so that they can be repacked under line pressure without removing the bonnet from the valve. Packing shall be adjustable.
- H. Valves shall be electrically operated.
  - 1. The valve operators to be supplied shall conform to the following specifications.
  - 2. The valve operators are to be manufactured by Auma Actuators, Inc. (Canonsburg, PA), or approved equal and shall consist of motor, gearing, limit switches, torque switches, hand wheel, control electrical connections, motor electrical connection and related components as outlined in **Items 2.2 D-M** above. **Exception: Change 2.2E-10 to “Motor shall be name plate rated for operation on 110 V, 1-PH, 60 Hz current” for plug valve electric actuators.**
  - 3.
- I. Operators shall be totally enclosed, worm gear type, permanently lubricated, and shall be watertight and dust tight.
- J. Operators shall be provided with adjustable stops for the open and closed position to prevent overtravel, and shall have a valve disk position indicator.
- K. Plug valves shall be those manufactured by DeZurik (Sartell, MN), or approved equal.

## 2.5 MUD VALVES

- A. Mud valves shall be located and sized as indicated on the Drawings and as specified herein. Mud valves shall be designed for basin drain applications, and shall be of the nonrising stem type with a flanged pipe connection. The valve body shall be constructed of cast iron with the stem, stem nut, disc ring, and seat ring of bronze. All bolts and nuts shall be stainless steel.
- B. The valves shall be furnished with operating nuts to be located at the positions shown on the Drawings. They shall also be furnished with Type 304, stainless steel extension stems, stem guides if required, and bench stands.
- C. The mud valves shall be as manufactured by Clow Corporation, or an approved equal product.

## 2.6 SLIDE GATES

- A. Gates shall be either self-contained or non self-contained of the rising stem, non-rising or telescopic stem configuration as indicated on the Contract drawings.
- B. The slide gates shall be Series 20 316L stainless steel flow control slide gates as manufactured by Fontaine/Rodney-Hunt Machine Co., Orange, MA; or approved equal product.
- C. Gates shall be listed by NSF-61 as a certified product.
- D. Gates and all metal components shall be made from 316L stainless steel unless otherwise noted.
- E. Slide gates shall be substantially watertight under the design head conditions. Under the design seating and unseating head, the leakage shall not exceed 0.05 U.S. gallon per minute per foot (0.60 l/min per meter) of seating perimeter.
  - 1. Manufacturer shall provide test data basis historical test results of 1000 gates within the last twelve months to demonstrate that 85% of gates shall meet a leakage rate less than 0.025 gallon per minute per foot (0.30 l/min per meter) of sealing perimeter for gates less than 20 ft head.
  - 2. The gate's sealing system should have been tested through a cycle test in an abrasive environment and should show that the leakage requirements are still obtained after 25,000 cycles with a minimum deterioration.

- F. The slide gates shall be designed to withstand the minimum design head depicted on the contract drawings.
- G. The gate shall utilize self-adjusting seals. Due to the difficulty of accessing gates when they are in service, gates that utilize adjustable wedges, wedging devices or pressure pads are not acceptable.
- H. All structural components of the frame and slide shall be fabricated of 316L stainless steel having a minimum thickness of 1/4-inch (6.4 mm) and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
- I. Welds shall be sandblasted to remove weld burn and scale. Gates shall be thoroughly cleaned to remove any contamination prior to shipment. All iron and steel components shall be properly prepared and shop coated with a primer.
- J. The top frame member or concrete structure shall support the bench stand as indicated on the Drawings.
- K. The frame shall be made of wrought stainless steel of the specified commercial grade or from commercially available structural shapes. The minimum material thickness of all members except seal retainers shall be 1/4- inch. (6.4 mm).
  - 1. All wall mounted and thimble mounted gates shall have a flanged back design frame. Flat back design frames are not acceptable.
  - 2. All wall mounted gates shall be suitable for mounting with a 1/2" (12mm) thick resilient gasket between the gate frame and the concrete wall. Mounting with grout pads will not be acceptable.
  - 3. A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flush bottom type on upward opening gates.
  - 4. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.
  - 5. A rigid stainless steel member shall be provided across the invert of the opening on downward opening gates.
- L. The slide and reinforcing stiffeners shall be constructed of stainless steel plate. All structural components shall have a minimum thickness of 1/4-inch (6.4 mm).
- M. Electrically actuated lifted slide gates shall have embedded or surface mounted frames and shall be as indicated on the Drawings and as herein specified. Electric actuators shall be Auma Actuators, Inc. (Canonsburg, PA), Flowserve Limitorque (Lynchburg, VA), or Rotork Gears Americas (Houston, TX) and comply with the specifications listed in **items 2.2D-M** above.
- N. The operating stem shall be constructed of stainless steel of the specified grade designed to transmit in compression at least 2 times the rated output of the operating manual mechanism with a 40 lbs. (178 N) effort on the crank or handwheel.
  - a. The stem shall have a slenderness ratio (L/r) less than 200. The threaded portion of the stem shall have machined cut threads of the Acme type.
  - b. In compression, the stem shall be designed for a critical buckling load caused by a 40 lb effort on the crank or handwheel with a safety factor of 2.4, using the Euler column formula.
  - c. Where a hydraulic, pneumatic or electric operator is used, the stem design force shall not be less than 1.25 times the output thrust of the hydraulic or pneumatic cylinder with a

pressure equal to the maximum working pressure of the supply, or 1.25 times the output thrust of the electric motor in the stalled condition.

- d. For stems in more than one piece and with a diameter of 1¾ inches (45 mm) and larger, the different sections shall be joined together by solid bronze couplings. Stems with a diameter smaller than 1¾ inches (45 mm) shall be pinned to an extension tube.
  - e. The couplings shall be grooved and keyed and shall be of greater strength than the stem.
- O. Stem guides shall be furnished when necessary to ensure that the L/r ratio shall not be greater than 200.
- a. Stem guides shall be fabricated from type 316L stainless steel. The guide shall be equipped with an UHMWPE bushing.
  - b. Guides shall be adjustable in two directions and spaced in accordance with the manufacturer's recommendation
- P. Self-contained gates shall be provided with a yoke made of structural members or formed plates fastened to the side frame members to provide a one-piece rigid assembly.
- 1. Yoke shall be designed to withstand the thrust of the actuator when a 80-lb (356-N) effort is placed on the handwheel or crank, with a minimum safety factor of 4 with regard to ultimate tensile, compressive, and shear strength and a minimum safety factor of 2 with regard to the tensile, compressive, and shear yield strength.
  - 2. Yokes for hydraulic cylinders shall meet the above criteria at the output thrust at maximum working pressure (pressure relief valve setting).
  - 3. Yokes for electric actuators shall be designed for a safety factor of 1.5 with regard to yield strength at the locked-rotor torque of the actuator.
  - 4. The yoke shall be designed to allow removal of the slide.
- Q. The wall thimble shall be supplied by the gate manufacturer in accordance with the contract drawings. Refer to the Contract Drawings for applicable locations.
- 1. The wall thimble section shall be "E" shaped, and its depth shall be equal to the thickness of the concrete wall in which the thimble is to be mounted.
  - 2. The wall thimble shall be constructed of stainless steel. Material thickness shall be minimum ¼-inch (6.4 mm) and be of sufficient thickness to handle the operating forces and installation stresses.
  - 3. The front or mounting flange of the wall thimble shall be accurately formed to provide a suitable mounting surface. The face of the wall thimble shall incorporate drilled and tapped inserts matching the gate bolt pattern.
  - 4. A water stop ring or flange shall be welded around the outside of the thimble.
  - 5. A resilient ½-inch (12 mm) thick gasket shall be provided to seal between the gate frame and the wall thimble.
- R. Anchor bolts shall be provided by the gate manufacturer for mounting the gates and appurtenances.
- 1. Quantity and location shall be determined by the gate manufacturer.

2. If epoxy type anchor bolts are provided, the gate manufacturer shall provide the studs and nuts.
  3. Gate frame anchor bolts shall have a minimum diameter of 1/2-inch (12 mm)
- S. Manufacturer shall furnish an authorized service technician to inspect and verify proper installation, assist with field testing, startup and commissioning.
- T. Following the completion of each gate installation, the gates shall be operated through at least two complete open/close cycles. If an electric or hydraulic operator is used, limit switches shall be adjusted following the manufacturer's instructions.
- U. The manufacturer shall submit the following drawings and data for approval by the purchaser.
1. Certified general arrangement drawings showing principal dimensions, details of construction, materials list, and details required for installation and operation.
  2. Design calculations confirming stress and deflection of the slide, yoke, and stem.
  3. Shop test reports including shop operation and leak test results.

## **2.7 COUPLING ADAPTER**

- A. The pipe couplings shall be of a gasketed, sleeve-type with diameter to properly fit the pipe. Each coupling shall consist of one (1) steel middle ring, of thickness and length specified, two (2) steel followers, two (2) rubber-compounded wedge section gaskets and sufficient track-head steel bolts to properly compress the gaskets. Field joints shall be made with this type of coupling. The middle ring and followers of the coupling shall be true circular sections free from irregularities, flat spots, or surface defects. They shall be formed from mill sections with the follower-ring section of such design as to provide confinement of the gasket. After welding, they shall be tested by cold expanding a minimum of 1 percent beyond the yield point. The coupling bolts shall be of the elliptic-neck, track-head design with rolled threads. The manufacturer shall supply information as to the recommended torque to which the bolts shall be tightened. All bolt holes in the followers shall be oval for greater strength. The gaskets of the coupling shall be composed of a crude or synthetic rubber base compounded with other products to produce a material which will not deteriorate from age, from heat, or exposure to air under normal storage conditions. It shall also possess the quality of resilience and ability to resist cold flow of the material so that the joint will remain sealed and tight indefinitely when subjected to shock, vibration, pulsation and temperature or other adjustments of the pipe line. The couplings shall be assembled on the job in a manner to insure permanently tight joints under all reasonable conditions of expansion, contraction, shifting and settlement, unavoidable variations in trench gradient, etc.
- B. Nuts and bolts shall be in accordance with AWWA C111.
- C. Couplings shall be shop primed and field painted in accordance with Division 9 (or one coat of coal tar epoxy if not specified in Division 9).
- D. Compression couplings shall be equal to Style 38 manufactured by Dresser. Flanged couplings shall have flanges in accordance with AWWA C207 and be equal to Style 128 manufactured by Dresser.

## **2.8 PRESSURE GAUGES**

- A. Pressure gauges shall have cast brass cases with bourdon tubes and precision rotary movements of bronze, nickel, or other material suitable to the environment in which they will be located. Dials shall be 6 inches in diameter with a pressure range of 0 to 100 psi. Provide female quick coupler for connection to corporation stop. Each gauge shall be provided with snuffer.
- B. Corporation stops shall be similar to Ford Products and shall have iron pipe threads with pack joint connection outlets. Provide male quick coupler for attachment of pressure gauge.

## **2.9 MECHANICAL PIPE COUPLINGS**

- A. Grooved and flexible-type couplings shall be Gustin-Bacon 100, Victaulic Style 77, or equal. Grooved end rigid-type couplings shall be Gustin-Bacon 120 Rigi-Grip, Victaulic Style 07 Zero-Flex, or equal. Flexible-type couplings shall be used for all piping greater than 12 inches in diameter and for pipe 12 inches in diameter and less in rack-mounted tunnel piping applications. All other applications for piping 12 inches in diameter and less shall utilize rigid-type couplings. Grooved end flanged coupling adapters shall be either Gustin-Bacon 154, Victaulic Style 741, or equal. Snap-joint grooved end couplings shall be Gustin-Bacon 115, Victaulic Style 78, or equal. Cut grooves are not permitted on fabricated or lightwall pipe. Unless otherwise specified, bolts and nuts shall comply with AWWA C606.
- B. Fittings for grooved end piping systems shall be full flow cast fittings, steel fittings, or segmentally welded fittings with grooves or shoulders designed to accept grooved end couplings. Cast fittings shall be cast of ductile iron conforming to ASTM A-536 or malleable iron conforming to ASTM A47. Standard steel fittings, including large size elbows, shall be forged steel conforming to ASTM A-106. Standard segmentally welded fittings shall be fabricated of schedule 40 carbon steel pipe.
- C. Unless otherwise specified, all fittings shall be rated for pressure and loadings equal to the pipe.

## **2.10 SLIDE WEIR PLATES**

- A. All slide weir plates (gates) and associated hardware shall be fabricated from 316 stainless steel.
- B. Structural design of weir plates and mounting hardware to be completed by manufacturer or specialty metal fabrication contractor.
- C. Basic weir gate design shall consist of one single steel plate with necessary bracing to support a design working head of five feet of water column.
- D. Weir gate shall be mounted to the front face of clear opening with C-channel style framing (slides) and shall be vertically adjustable across the full height of the clear opening in which it covers.
- E. Weir gate shall be adjustable in the vertical direction along the slides by lifting or pushing down on a T shaped handle with 2" diameter lift ring attached to the top.
- F. Gate shall be lockable in desired location to prevent movement during plant operation. Locking mechanism could be by means of a clamp, removable pin, etc. and is at the manufacturer's discretion. Locking mechanism shall be easily operated by operator and shall be adjustable in no more than 1-inch vertical increments. It can be assumed that in order to remove the locking mechanism the operator may have to temporarily drain a portion of the plant to access the mechanism.



## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Valves shall be installed as nearly as possible in the positions indicated on the Drawings consistent with conveniences of operating the handwheel or wrench. All valves shall be carefully erected and supported in their respective positions free from all distortion and strain on appurtenances during handling and installation.
- B. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness.
- C. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.
- D. Valves shall not be installed with stems below the horizontal.
- E. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer. Valves in the control piping shall be installed so as to be easily accessible.
- F. Valves shall be provided with extension stems where required for convenience of operation. Extension stems shall be provided for valves installed underground and elsewhere so that the operating wrench does not exceed 6 feet in length.
- G. A permanent type gasket of uniform thickness shall be provided between flanges of valves and sluice gates and their wall thimble.
- H. Wall thimbles shall be accurately set in the concrete walls so that the gates can be mounted in their respective positions without distortion or strain.
- I. Floorstand operators and stem guides shall be set so that the stems shall run smoothly in true alignment. Guides shall be anchored firmly to the walls. Distances from the centerlines of gates to the operating level or base of floorstand shall be checked by the Contractor and adjusted if necessary to suit the actual conditions of installation.

### **3.2 PAINTING**

- A. Valves shall be factory primed and fully coated, inside and out, with fusion bonded epoxy in accordance with the latest revision of AWWA C550 Standard.
- B. Other painting is specified in Division 9.

**END OF SECTION**

**SECTION 02930**  
**SEEDING**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Upon completion of the Project, the Contractor shall remove all debris and surplus construction materials resulting from its work. The Contractor shall grade the ground along each side of the pipe trenches and/or structures in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line, or as shown on the Drawings.

**PART 2 - PRODUCTS**

**2.1 SEED**

- A. Grass seed shall be mixed and guaranteed by the supplier to consist of the following:
1. Annual Rye: 60 percent.
  2. Kentucky Bluegrass: 20 percent.
  3. Falcon Fescue: 20 percent.

**2.2 TOPSOIL**

- A. Topsoil shall be material stripped and stored under work of Section 02110 and shall be used for all work under this Section. If the quantity of stored topsoil is inadequate or if none has been salvaged from the Project site, the Contractor shall furnish at its own expense sufficient topsoil to properly install all work as specified herein. Topsoil shall be original surface loam obtained from well drained areas from which topsoil has not been removed previously, either by erosion, clearing and removal of trees or mechanical means. It shall not contain subsoil material and shall be clean and free of clay lumps, roots, stones or similar substances more than 2 inches in any dimension, debris, discarded fragments of building materials or weeds and weed seeds.

**2.3 SOIL IMPROVEMENTS**

- A. Commercial fertilizers shall be of analyses specified, or as recommended by the Agricultural Extension Service for treatment of topsoil in the area from which removed, and shall conform to the applicable state fertilizer laws. Fertilizer shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.
- B. Lime, if recommended for soil treatment by the Agricultural Extension Service, shall be ground limestone (Dolomite) containing not less than 85 percent of total carbonates, and shall be ground to such a fineness that 50 percent will pass through a 100-mesh sieve, and 90 percent will pass through a 20-mesh sieve. Coarser material shall be acceptable provided that required rates of application are increased proportionally on the basis of quantities passing the 100-mesh sieve.

**PART 3 - PART 3 - EXECUTION**

**3.1 SEEDING**

- A. After installation of the Project, topsoil shall be spread evenly to a minimum 4-inch depth and lightly compacted. No topsoil shall be spread in a frozen or muddy condition.

1. Any stored topsoil remaining after work is in place shall be disposed of by the Contractor as directed by the Engineer.
- B. Soil improvement shall be made if and as recommended by the Agricultural Extension Service prior to seeding.
  1. Ground limestone, if required, shall be applied at the recommended rates per square yard and shall be thoroughly mixed into the topsoil.
  2. Fertilizers, if required shall be of analysis and rates per square yard as recommended in the topsoil analysis and shall be mixed lightly in the top few inches of topsoil.
- C. Immediately before any seed is to be sown, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable and of a uniformly fine texture. Areas shall be seeded evenly with a mechanical spreader at a rate of 2 pounds per 1,000 square feet, lightly raked and watered with a fine spray.
- D. After seed has been distributed, the Contractor shall cover areas that are likely to washout with straw to a depth of 1-1/2 inches.
- E. Seeded areas shall be protected and maintained by watering, regular mowing and reseeding as may be necessary to produce a uniform stand of grass. Maintenance shall continue throughout the guarantee period until a dense, uniform turf is established.
- F. All paved streets, roads, sidewalks, curbs, fences, stonewalls, lawns, etc., disturbed during construction shall be restored, repaired, or replaced to as good a condition as existed prior to construction. All materials and workmanship shall conform to standard practices and specifications of the Owner and/or the Kentucky Department of Highways, whichever applies.
- G. The Contractor shall remove from the site all equipment, unused materials and other items at its expense. The construction site shall be left in a neat, orderly condition, clear of all unsightly items, before the Work is finally accepted.

**END OF SECTION**

**HDR**

**D I V I S I O N 3**

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**Concrete**

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**SECTION 03100**  
**CONCRETE FORMWORK**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.
- B. Openings for other affected work.
- C. Form accessories.
- D. Stripping forms.

**1.2 RELATED WORK**

- A. Section 03210 - Reinforcing Steel.
- B. Section 03251 - Expansion and Contraction Joints.
- C. Section 03310 - Structural Concrete.

**1.3 REFERENCES**

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ACI 347 - Recommended Practice for Concrete Formwork.
- C. PS 1 - Construction and Industrial Plywood.
- D. ACI 318 - Building Code Requirements for Reinforced Concrete.
- E. ACI 350 R - Environmental Engineering Concrete Structures.

**1.4 SYSTEM DESCRIPTION**

- A. Design, engineer and construct formwork, shoring, bracing to meet design and code requirements so that resultant concrete conforms to required shapes, lines, dimensions and tolerances.

**1.5 QUALITY ASSURANCE**

- A. Construct and erect concrete formwork in accordance with ACI 301 and 347, latest revisions.

**PART 2 - PRODUCTS**

**2.1 FORM MATERIALS**

- A. Plywood; Douglas Fir species; medium density overlaid one side grade; sound, undamaged sheets with straight edges.
- B. Glass fiber fabric reinforced plastic forms; matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.
- C. Forms shall be sufficiently rigid to prevent displacement or sagging between supports and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- D. For surfaces to be given a rubbed finish, the form surface in contact with the concrete shall be made of heavy gage metal, new plywood (used plywood may not be used), tempered wood fiberboards with smooth surface, or similar material. Metal forms or form linings shall have square edges so that the

concrete will not have fins or fluting. Forms shall not be pieced out by use of material different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.

- E. For surfaces other than those to be given a rubbed finish, forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonably good as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16-inch.
- F. Forms for walls, columns, or piers shall have removable panels at the bottom for cleaning, inspection, and scrubbing in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.
- G. Forms for exposed surfaces shall be built with 3/4-inch chamfer strips attached to produce smooth, straight chamfers at all sharp edges of concrete.
- H. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.
- I. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged places repaired, and all projecting nails withdrawn.

## **2.2 FORMWORK ACCESSORIES**

- A. Form ties to be encased in concrete shall not be made of through bolts or common wire, but shall be made and installed as to embody the following features:
  - 1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 inch to the face of the concrete.
  - 2. That part of the tie which is to be removed shall be at least 1/2-inch in diameter, or if smaller, it shall be provided with a wood or metal cone 1 inch long placed against the inside of the forms. Cones shall be carefully removed from the concrete after the forms have been stripped.
  - 3. Ties which pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.
- B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete. Form oil shall be placed prior to reinforcing steel when possible and surplus oil on form surfaces or reinforcing steel shall be removed.
- C. Fillets for Chamfered Corners: Wood strip type to the size and shape as shown on the Drawings (or 3/4-inch if not shown).
- D. Dovetail Anchor Slots: Heavy duty, minimum 24 gage thick galvanized steel; foam filled; release tape sealed slots; secure anchoring system for attachment to concrete formwork.
- E. Nails, spikes, lag bolts, through bolts, anchorages: Sized as required of strength and character to maintain formwork in place while placing concrete.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Verify lines, levels and measurements before proceeding with formwork.

### **3.2 PREPARATION**

- A. Earth forms not permitted except for continuous strip footings of buildings.

### **3.3 ERECTION**

- A. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
- B. Camber slabs and beams to achieve ACI 301 tolerances.
- C. Provide temporary ports in formwork to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.
- D. Concrete surfaces not exposed to view shall be formed with sound tight lumber or other material producing equivalent finish.
- E. Concrete surfaces to be exposed to view shall be formed with material that is not reactive with concrete surfaces and shall be equivalent in smoothness and appearance to that produced by new plywood panels conforming to PS 1, exterior type Grade B-B.

### **3.4 APPLICATION OF RELEASE AGENT**

- A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

### **3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS**

- A. Provide formed openings where required for work embedded in or passing through concrete.
- B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

### **3.6 FORM REMOVAL**

- A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and construction and design loads which may be imposed upon it. Remove load supporting forms when concrete has attained 75 percent of required 28-day compressive strength, provided construction is reshored.
- B. Reshore structural members due to design requirements or construction conditions to permit successive construction.
- C. Remove formwork progressively so that no unbalanced loads are imposed on structure.
- D. Do not damage concrete surfaces during form removal.

### **3.7 CLEANING**

- A. Clean forms to remove foreign matter as erection proceeds.
- B. Ensure that water and debris drain to exterior through clean out ports.
- C. During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

**END OF SECTION**

**SECTION 03210**  
**REINFORCING STEEL**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Reinforcing steel.
- B. Shop Drawings.

**1.2 RELATED WORK**

- A. Section 03100 - Concrete Formwork.
- B. Section 03251 - Expansion and Contraction Joints.
- C. Section 03310 - Structural Concrete.

**1.3 REFERENCES**

- A. ASTM A-615.
- B. ASTM A-616.
- C. ASTM A-617.
- D. ACI 351.
- E. ASTM A-120.
- F. ASTM A-185.

**1.4 SUBMITTALS**

- A. Shop Drawings: The Contractor shall submit a complete set of shop drawings including schedules and bending drawings for all reinforcement used in the work in accordance with the "Manual of Standard Practice for Detailing Concrete Structures" (ACI 351).
- B. Submittals: The Contractor shall submit the shop drawings in accordance with Section 00700 and Section 01300.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A-615, A-616, or A-617. All bar reinforcement shall be deformed.
- B. Smooth dowels shall be plain steel bars conforming to ASTM A-615, Grade 40, or steel pipe conforming to ASTM A-120, Schedule 80. Pipe, if used, shall be closed flush at each end with mortar or metal or plastic cap.
- C. Welded wire fabric shall conform to ASTM 185, welded steel wire fabric for concrete reinforcement.
- D. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall have approved high density polyethylene tips so that the metal portion shall be at least 1/4-inch from the form or surface. Supports for



reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks.

## 2.2 FABRICATION

- A. Reinforcement shall be bent cold. It shall be bent accurately to the dimensions and shapes shown on the plans and to within tolerances specified in the CRSI Manual of Standard Practice.
- B. Reinforcing shall be shipped with bars of the same size and shape, fastened securely with wire and with metal identification tags giving size and mark.

## PART 3 - EXECUTION

### 3.1 PLACING AND FASTENING

- A. Before being placed in position, reinforcement shall be cleaned of loose mill and rust scale, dirt and other coatings that will interfere with development of proper bond.
- B. Reinforcement shall be accurately placed in positions shown on the Drawings and firmly held in place during placement and hardening of concrete by using annealed wire ties. Bars shall be tied at all intersections except where spacing is less than 1 foot in both directions, then alternate intersections may be tied.
- C. Distance from the forms shall be maintained by means of stays, blocks, ties, hangers or other approved supports. If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.
- D. **Before any concrete is placed, the Engineer shall have inspected the placing of the steel reinforcement and given permission to deposit the concrete. Concrete placed in violation of this provision will be rejected and thereupon shall be removed.**
- E. Unless otherwise specified, reinforcement shall be furnished in the full lengths indicated on the Drawings. Splicing of bars, except where shown on the Drawings, will not be permitted without the approval of the Engineer. Where splices are made, they shall be staggered insofar as possible.
- F. Wire mesh reinforcement shall be continuous between expansion joints. Laps shall be at least one full mesh plus 2 inches, staggered to avoid continuous lap in either direction and securely wired or clipped with standard clips.
- G. Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased or dowels shall be coated with high density polyethylene with a minimum thickness of 14 mils.

**END OF SECTION**

**SECTION 03251**  
**EXPANSION AND CONTRACTION JOINTS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Forming integral contraction and control joints in concrete.
- B. Visually concealing expansion joints in concrete.

**1.2 RELATED WORK**

- A. Section 03100 - Concrete Formwork.
- B. Section 03310 - Structural Concrete.
- C. Section 01300 - Submittals.

**1.3 SUBMITTALS**

- A. The Contractor shall submit shop drawings and/or cut sheets for review in accordance with Specification Section 01300.

**PART 2 - PRODUCTS**

**2.1 INTEGRAL JOINT MATERIALS**

- A. Waterstop: Hydrophilic rubber waterstop by Greenstreek, HYDROTITE. Use LEAKMASTER at all splices and exposed cells. Size as noted on the Drawings.
- B. Formed Construction Joints: Galvanized steel, tongue and groove type; with removable top strip exposing sealant trough knockout holes spaced at 6 inches on center, ribbed steel spikes with tongue to fit top screed edge.
- C. Joint Filler: ANSI/ASTM D994, bituminous impregnated fiberboard; closed cell neoprene; self-expanding cork; of the sizes detailed and in the locations indicated on the Drawings. Bituminous impregnated fiberboard shall not be used to fill joints in liquid retaining structures.

**2.2 EXTERNAL JOINT COVERS**

- A. Joint covers: ANSI/ASTM B221; alloy extruded aluminum retainers with resilient neoprene filler strip; extruded aluminum cover plate; 25 shore hardness; to permit plus or minus 50 percent joint movement; of longest manufactured length; mounted as detailed; with anchors.

**2.3 SEALANTS**

- A. Sealant and Caulking: Specified in Section 07900.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Locate and form expansion control and contraction joints.

- B. Install waterstops continuous without displacing reinforcement. All joints between adjacent continuing and intersecting sections of waterstop including butt joints, tee joints, and other angled joints shall be sealed with LEAKMASTER form a watertight seal. Waterstops shall not be lapped. Comply with manufacturers recommendations.
- C. Place formed construction joints in slabs or walls as detailed on the Drawings or as directed by the Engineer. Set top screed to required elevations. Secure to resist movement of wet concrete.
- D. Install joint cover anchorage in accordance with manufacturer's instructions. Set cover as detailed in the Drawings or as directed by the Engineer.
- E. Install joint fillers and sealants in accordance with manufacturer's instructions. Use primers of type recommended by joint filler and sealant manufacturer.
- F. Apply sealants in accordance with Section 07900.
- G. Install joint covers after adjacent construction activity is complete.

**END OF SECTION**

**SECTION 03310**  
**CAST-IN-PLACE STRUCTURAL CONCRETE**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. The work in this section shall include all formwork, shoring, bracing, anchorage, concrete reinforcement and accessories for cast-in-place concrete.

**1.2 GENERAL REQUIREMENT**

- A. All concrete construction shall conform to all applicable requirements of ACI 301, ACI 318 and ACI 350 R, except as modified by the supplemental requirements specified herein.

**1.3 RELATED WORK**

- A. Section 03100 - Concrete Formwork.  
B. Section 03370 - Concrete Curing.  
C. Section 05500 - Miscellaneous Metals, Fasteners, and Special Finishes.

**1.4 REFERENCES**

- A. The Contractor shall obtain and have available in the field office at all times the following references:
1. Specifications for Structural Concrete for Building ACI 301 (latest revision).
  2. Field Reference Manual: Specifications for Structural Concrete for Buildings ACI Sp-15.
  3. Manual of Standard Practice - CRSI (latest revision).
  4. Placing Reinforcing Bars - CRSI (latest revision).
  5. Building Code Requirements for Reinforced Concrete ACI 318.
  6. Environmental Engineering Concrete Structures ACI 350R.
- B. The following standard shall also apply to this work:
1. ASTM C-143.
  2. ASTM C-150.
  3. ASTM C-33.
  4. ASTM C-260.
  5. ASTM C-494.
  6. ASTM A-615.
  7. ASTM D-638.
  8. ASTM D-695.
  9. ASTM D-570.
  10. ASTM D-1252.
  11. ASNI A-116.1.
  12. ASTM A-120.
  13. ASTM C-94.
  14. ASTM D-2146.
  15. Federal Specifications FF-S-325.

**1.5 SUBMITTALS**

- A. The Contractor shall submit the following data to the Engineer for review:
1. Proposed mix designs, test results, plotted curves and all other substantiating data as required by ACI 301.
  2. Mix designs for all mixes proposed or required to be used, including all mixes containing admixtures.

3. A certified copy of the control records of the proposed production facility establishing the standard deviation as defined in ACI 301.
- B. Certification attesting that admixtures equal or exceed the physical requirements of ASTM C-494 for Type A admixture and when required, for Type D admixture.
- C. Notarized certifications by the manufacturer that epoxy bonding adhesive meets the specification contained herein.
- D. Drawings showing locations of all proposed construction joints.
- E. Shop drawing for reinforcing steel showing bar schedules, location, and splices.

## 1.6 QUALITY ASSURANCE

- A. Consistency:
  1. Concrete shall be of such consistency that it can be worked readily into all parts of the forms and around embedded work, without permitting the materials to segregate, or free water to collect on the surface. Consistency shall be measured by the ASTM Standard Test Method for Slump of Portland Cement Concrete, Designation C143. The consistency of concrete shall be as given in Table I, of the standard.
  2. Slump tests shall be made in the field by the Contractor.
- B. Compression Tests:
  1. During the progress of the work, at least one set of four compression test cylinders shall be made for each 50 cubic yards of concrete or major fraction thereof, and not less than one such set for each type of concrete for each days' pouring. Cylinders made in the field shall be made and cured in accordance with ASTM Standard Method of Making and Curing Concrete Test Specimens in the Field, Designation C31, except that wherever possible molds shall be left on cylinders until they have reached the laboratory.
  2. One (1) cylinder of each set shall be broken in accordance with ASTM C-39 at seven (7) days and two (2) at twenty-eight (28) days. Two (2) copies of these test results shall be submitted to the Engineer on the same day of the tests. The remaining cylinder shall be reserved for future testing if required.
  3. On evidence of these tests, any concrete that fails to meet the specified strength requirements shall be strengthened or replaced as directed by the Engineer at the Contractor's expense.
- C. Inserts in Concrete by Other Trades:
  1. All trades shall be notified, at the proper time, to install items to be embedded in concrete.
  2. All castings, inserts, conduits, and other metalwork shall be accurately built into or encased in the concrete by the Contractor as directed and all necessary precautions shall be taken to prevent the metalwork from being displaced or deformed.
  3. Anchor bolts shall be set by means of substantial templates.
  4. The Contractor shall build into new concrete against which facing brick or tile is to be laid, suitable, acceptable, non-corrodible metal, dovetail grooves for ties for securing the brickwork to the concrete.
- D. Testing:
  1. All testing shall be in accordance with provisions of ACI 301.
  2. Testing services listed in ACI 301 shall be performed by a testing agency acceptable to the Engineer. Testing services to meet the requirements of ACI shall be paid for by the OWNER. Test shall be made for each 50 cubic yards of concrete and/or each day concrete is placed.
- E. Additional Requirements:
  1. Unless otherwise directed by the Engineer, the vertical surfaces of all footings shall be formed. Excavations and reinforcement for all footings shall have been inspected by the Engineer before any concrete is placed.

2. The installation of underground and embedded items shall be inspected before slabs are placed. Pipes and conduits shall be installed below the concrete unless otherwise indicated. Fill required to raise the subgrade shall be placed as specified in Division 2. Unless shown otherwise, porous fill not less than 6 inches in compacted thickness shall be installed under all slabs, tank bottoms, and foundations. The fill shall be leveled and uniformly compacted to a reasonably true and even surface. The surfaces shall be clean, free from frost, ice, mud and water. Where indicated, waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness, or polyethylene coated burlap shall be laid over surfaces receiving concrete.
- F. Hot Weather Requirements: Placing of concrete under conditions of high temperatures, low humidity or wind shall be done in accordance with the American Concrete Institute "Hot Weather Concreting" (ACI 305R).
- G. Cold Weather Requirements: Cold weather concreting procedures and precautions shall conform with American Concrete Institute "Cold Weather Concreting" (ACI 306R).

## **PART 2 - PRODUCTS**

**2.1** Contractor shall supply concrete only from an approved ready mixed concrete supplier.

### **2.2 CONCRETE MIX WITHOUT FLY ASH**

- A. Structural concrete of the various classes required shall be proportioned by ACI 301, in addition to the limitation herein listed, to produce the following minimum 28-day compressive strengths:
- B. Selection of Proportions for Class A Concrete:
1. 4,500 psi compressive for strength at 28 days.
  2. Type II cement plus water reducing, dispersing agent and air. Type IP cement may be used in place of Type II.
  3. Maximum water/cement plus water reducing dispersing agent ratio = 0.42.
  4. Minimum cement content = 564 pounds (6.0 bags)/cubic yards concrete.
  5. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
  6. Air content = 6 percent plus or minus 2 percent by volume.
  7. Slump = 2 inches to 3 inches in accordance with ASTM C-143.
- C. Selection of proportions for Class B concrete:
1. 3,000 psi compressive strength at 28 days.
  2. Type I cement plus water reducing dispersing agent and air.
  3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.50.
  4. Minimum cement content = 432 pounds (4.5 bags)/cubic yards concrete.
  5. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
  6. Air content = 6 percent plus or minus 2 percent by volume.
  7. Slump = 3 inches to 4 inches in accordance with ASTM C-143.

### **2.3 OPTIONAL CONCRETE MIX USING FLY ASH**

- A. Selection of Proportions for Class A Concrete:
1. 4,500 psi compressive for strength at 28 days.
  2. Type II cement plus water reducing dispersing agent and air.
  3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.42.
  4. Minimum cement content = 517 pounds (5.5 bags)/cubic yards concrete.
  5. Maximum Fly Ash Content = 71 pounds/cubic yards
  6. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
  7. Air content = 6 percent plus or minus 2 percent by volume.
  8. Slump = 2 inches to 3 inches in accordance with ASTM C-143.

- B. Selection of Proportions for Class B Concrete:
  1. 3,000 psi compressive strength at 28 days.
  2. Type II cement plus water reducing dispersing agent and air.
  3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.50.
  4. Minimum cement content = 376 pounds (4.0 bags)/cubic yards concrete.
  5. Maximum Fly Ash Content = 94 pounds/cubic yards.
  6. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
  7. Air content = 6 percent plus or minus 2 percent by volume.
  8. Slump = 3 inches to 4 inches in accordance with ASTM C-143.
- C. Applicable Standards:
  1. ANSI C 311, "Standard Methods of Sampling and Testing Fly Ash for Use as an Admixture in Portland Cement Concrete".
  2. ANSI C 618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete".
- D. Concrete shall be used as follows:
  1. Class A concrete for all concrete work except as noted below.
  2. Class B concrete for fill concrete, thrust blocks, drilled piers, and where indicated on the Drawings.
- E. All testing shall be or have been performed by an approved independent testing laboratory.
- F. Cement for exposed concrete shall have a uniform color classification.
- G. Type II cement conforming to ASTM C-150 shall be used in all structural concrete. The alkali content shall not exceed 0.6 percent calculated as sodium oxide. Type IP Cement may be used in place of Type II cement, for mix designs not using fly ash.
- H. Coarse aggregate shall conform to all requirements of ASTM C-33.
- I. Manufactured sand shall not be used as fine aggregate in concrete.

## 2.4 FLY ASH CONCRETE

- A. In the absence of a verified and acceptable history of fly ash concrete mixes, the following procedure is required to establish the quality of the concrete mix.
- B. Trial batches must be made starting thirty (30) days ahead of initial concrete pour. Four (4) mixes shall be designed and produced at no cost to the Owner or the Engineer as follows:
  1. Mix using Type II cement with water reducing admixture for normal temperatures (Class A).
  2. Mix using Type II cement with water reducing admixture for cold weather temperatures (Class A).
  3. Mix using Type II cement with water reducing admixture for hot weather temperatures (Class A).
  4. Mix using Type II cement with water reducing admixture for normal weather temperatures (Class B).
- C. Four (4) test cylinders shall be cast for each of the four (4) mixes. Two (2) cylinders shall be broken at 7 days, and two (2) cylinders shall be broken at 28 days, for each of the four (4) mixes. The trial batch design report shall include strength breaks at 7 days and 28 days, air content, etc.
- D. The water-reducing, cement dispersing admixture (such as Master Builders Pozzolith 344-N, Nox-Crete Plastiflow, Plastocrete 161 by SIKA Chemical Company, or approved equivalent) used in fly ash concrete, shall be a normal, accelerated, or retarded hardening admixture. The admixture shall be used at optimum dosage to offset the slow strength development and setting characteristics of the fly ash. Only those brands of admixture that can provide readily available field service on short notice to provide field services, inspection, and assistance, will be acceptable.
- E. Recent mill reports shall be submitted prior to the use of fly ash concrete, with continuing reports on a regular basis during the project. Maximum loss on ignition (LOI) shall be 6 percent.
- F. Tests for air content shall be made twice a day at the jobsite prior to placement, for all mixes containing fly ash.

## 2.5 ADMIXTURES

- A. An air entraining admixture shall be used on all concrete and shall be the neutralized vinsol resin type such as Master Builders MB-VR, or Euclid Chemical Co. AIR-MIX or equivalent. The admixture shall meet the requirements of ASTM C-260. Certification attesting to the percent of effective solids and compliance of the material with ASTM C-260 shall be furnished, if requested.
- B. A water reducing, set controlling admixture (non-lignin type) shall be used in all concrete. The admixture shall be a combination of polyhydroxylated polymers including catalysts and components to produce the required setting time based on job site conditions, specified early strength development, finishing characteristics required, and surface texture, as determined by the Engineer.
- C. Certification shall be furnished attesting that the admixture exceeds the physical requirements of ASTM C-494, Type A, water reducing and normal setting admixture, and when required, for ASTM C-494, Type D, water reducing and retarding admixture when used with local materials with which the subject concrete is composed.
- D. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He also will be available when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.
- E. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met.
- F. The admixture shall conform to ASTM C-494 except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C-494.
- G. Where the Contractor finds it impractical to employ fully the recommended procedures for hot weather concreting, the Engineer may at his discretion require the use of a set retardant admixture for mass concrete greater than 2.5 feet thick and for all concrete whenever the temperature at the time concrete is cast exceeds 80 degrees F. The admixture shall be selected by the Contractor subject to the review of the Engineer. The admixture and concrete containing the admixture shall meet all the requirements of these Specifications. Preliminary tests of this concrete shall be required at the Contractor's expense.
- H. Admixtures shall be used in concrete design mixes in the same manner and proportions as in the field so that the effects of the admixtures are included in preliminary tests submitted to the Engineer for review prior to the start of construction.
- I. When more than one admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.
- J. Calcium chloride will not be permitted as an admixture in any concrete.

## 2.6 WATER

- A. The water for concrete shall be potable water. Site added mix water, where allowed, shall also be potable.

## 2.7 AGGREGATES

- A. Fine aggregates shall be natural sand having clean, hard, uncoated grains, free from injurious amounts of clay, dust, organic matter or other deleterious substances, and shall conform to ASTM C-33.
- B. Coarse aggregates shall be crushed stone having clean, hard, uncoated particles, and shall be free from injurious amounts of soft, friable, thin, elongated or laminated pieces. Shale may not be used as aggregate. Coarse aggregates shall conform to ASTM C-33 and shall not exceed the following maximum sizes:
  - 1. 3/4-inch for slabs, beams, girders, and walls.
  - 2. 1-inch for all other concrete.



## **2.8 TESTING AGGREGATES AND DETERMINING PROPORTIONS**

- A. No concrete shall be used in the work until the materials and mix design have been accepted by the Engineer.
- B. The conformity of aggregates to the specifications hereinbefore given shall be demonstrated and determined by tests per ASTM C-33 made with representative samples of the materials to be used on the work.
- C. The actual proportions of cement, aggregates, admixtures and water necessary to produce concrete conforming to the requirements set forth shall be determined by making test cylinders using representative samples of the materials to be used in the work. A set of four (4) standard 6-inch cylinders shall be made and cured per ASTM C-31. Two (2) shall be tested at 7 days and two (2) at 28 days per ASTM C-39. The slump shall not be less than the greatest slump expected to be used in the work.
- D. Reports on the tests and a statement of the proportions proposed for the concrete mixture, shall be submitted in triplicate to the Engineer for review as soon as possible, but not less than five (5) days prior to the proposed beginning of the concrete work. If the Contractor furnishes in writing, similar, reliable detailed information from an acceptable source, and of date not more than four (4) months prior to the time when concrete will be used on this project, the above requirements for laboratory tests may be modified by the Engineer. Such data shall derive from mixtures containing constituents, including the admixtures where used, of the same types and from the same sources as will be used on this project.
- E. The Engineer shall have the right to make check tests of aggregates and concrete, using the same materials, and to order changes as may be necessary to meet the specified requirements.
- F. The Contractor may request permission to add water at the job site, and when the addition of water is permitted by the Engineer, the quantity added shall be the responsibility of the Contractor and in no case shall the total water per bag of cement exceed that determined by the designed mix.
- G. All concrete exposed to weather, such as foundations, walls, exterior steps and retaining walls, etc. shall be air entrained.
- H. If concrete of the required characteristics is not being produced as the work progresses, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure concrete of the specified quality. The Contractor shall make such changes at his own expense and no extra compensation will be allowed because of such changes.

## **2.9 MIXING**

- A. All central plant and rolling stock equipment and methods shall conform to the Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready Mixed Concrete Assn., as well as the ACI Standards for Measuring, Mixing and Placing Concrete (ACI 614), and with Sections 7 to 14, inclusive, of the ASTM Standard Specification for Ready Mixed Concrete, Designation C94-78a, insofar as applicable.

## **2.10 WATERSTOPS**

- A. See Section 03251 - Expansion and Contraction Joints.

# **PART 3 - EXECUTION**

## **3.1 PLACING AND COMPACTING CONCRETE**

- A. At least 20 hours before the Contractor proposes to make any placement of concrete, he shall notify the Engineer of his intention and planned procedure. Unless otherwise permitted, the work shall be so executed that a section begun on any day shall be completed during daylight of the same day.

- B. Ready mixed concrete shall be transported to the site in watertight agitator or mixer trucks. The quantity of concrete to be mixed or delivered in any one batch shall not exceed the rated capacity of the mixer or agitator for the respective conditions as stated on the nameplates.
- C. Central mixed concrete shall be plant mixed a minimum of 1-1/2 minutes per batch, and then shall be truck mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the premixed concrete is placed in the truck and shall continue without interruption until discharge. For transit mixed concrete, the major portion of the mixing water shall be added and mixing started immediately after the truck is charged.
- D. The amount of water initially added shall be recorded on the delivery slip for the Engineer's information, no additional water shall be added, either in transit or at the site, except as directed. Mixing (at mixing speed) shall be continued for at least 10 minutes followed by agitation without interruption until discharge. Concrete shall be discharged at the site within 1-1/2 hours after water was first added to the mix, and shall be mixed at least 5 minutes after all water has been added.
- E. Concrete which has become compacted or segregated during transportation to or on the site of the work shall be satisfactorily remixed just prior to being placed in the forms.
- F. Partially hardened concrete shall not be deposited in the forms. The retempering of concrete which has partially hardened (that is, the remixing of concrete with or without additional cement, aggregate, or water) will not be permitted.
- G. The concrete shall be mixed only in the quantity required for immediate use. Concrete that has developed an initial set shall not be used. The Contractor shall have sufficient plant capacity and transporting apparatus to insure continuous delivery at the rate required.
- H. The temperature of the concrete mixture immediately before placement shall be between 50 degrees F and 90 degrees F.
- I. Concrete mixed in stationary mixers and transported by nonagitating equipment shall be placed in the forms within 45 minutes from the time ingredients are charged into the mixing drum. Concrete that is truck mixed or transported in truck mixers or truck agitators shall be delivered to the site of the work and discharge completed in the forms within the time specified in paragraph 10.7 of ASTM C-94, except that when the concrete temperature exceeds 85 degrees F, the time shall be reduced to 30 minutes. Transit mixed concrete that is completely mixed at the site of concrete placement or batched cement and aggregates transported to mixers shall be placed in the forms within 1-1/2 hours after cement has been added. Concrete shall be placed in the forms within 15 minutes after discharge from the mixer at the job site.
- J. If concrete is placed by pumping, no aluminum shall be used in any parts of the pumping system which contact or might contaminate the concrete. Aluminum chutes and conveyors shall not be used.
- K. No concrete shall be placed until the subgrade has been accepted in accordance with the requirements of Section 01400, Quality Control, nor shall it be placed on frozen subgrade or in water. Placement of concrete shall not be scheduled until the forms, reinforcing, and preliminary work have been accepted. No concrete shall be placed until all materials to be built into the concrete have been set and have been accepted by the various trades and by the Engineer. All such materials shall be thoroughly clean and free from rust, scale, oil, or any other foreign matter.
- L. Forms and excavations shall be free from water and all dirt, debris, and foreign matter when concrete is placed. Except as otherwise directed, wood forms and embedded wood called for or allowed shall be thoroughly wetted just prior to placement of concrete.
- M. Concrete placed at air temperatures below 40 degrees F shall have a minimum temperature of 50 degrees F and a maximum of 70 degrees F when placed.

- N. Chutes for conveying concrete shall be metal or metal lined and of such size, design, and slope as to ensure a continuous flow of concrete without segregation. The slope of chutes shall have approximately the same slope. The discharge end of the chute shall be provided with a baffle, or if required, a spout and the end of the chute. The spout shall be kept as close as practicable to, but in no event more than 5 feet above the surface of the fresh concrete. When the operation is intermittent, the chute shall discharge into a hopper.
- O. In thin sections of considerable height (such as walls and columns), concrete shall be placed in such manner as will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the mass of concrete being placed. To achieve this end, suitable hoppers spouts with restricted outlets, etc. shall be used as required or permitted unless the forms are provided with suitable openings.
- P. Chutes, hoppers, spouts, etc. shall be thoroughly cleaned before and after each run and the water and debris shall not be discharged inside the form.
- Q. For any one placement, concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section, and so as to maintain until the completion of the unit, an approximately horizontal plastic surface.
- R. No wooden spreaders shall be left in the concrete.
- S. During and immediately after being deposited, concrete shall be thoroughly compacted by means of suitable tools and methods, such as internal type mechanical vibrators operating at not less than 5,000 rpm. or other tool spading to produce the required density and quality of finish. Vibration shall be done only by experienced operators and shall be carried in such manner and only long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents, "pumping" of air, or other objectionable results.
- T. The concrete shall be thoroughly rodded and tamped about embedded materials so as to secure proper adhesion and prevent leakage. Care shall be taken to prevent the displacement of such materials during concreting.
- U. The distance between construction joints shall not exceed 25 feet for all concrete construction and not less than 48 hours shall elapse between casting of adjoining units unless these requirements are waived by the Engineer. Provision shall be made for jointing successive units as indicated or required. Where joints are not shown on the Drawings, they are required to be made at a spacing of approximately 25 feet. Additional construction joints required to satisfy the 25 foot spacing requirement shall be located by the Contractor subject to the review of the Engineer. The Contractor shall submit for review Drawings separate from the steel reinforcing Drawings, showing the location of all proposed construction joints. All construction joints shall be prepared for bonding as specified in ACI Standard 301. Joints in walls and columns shall be maintained level.
- V. Formwork for beam soffits and slabs and other parts that support the weight of concrete shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.

### **3.2 BONDING CONCRETE AT CONSTRUCTION JOINTS**

- A. In order to secure full bond at construction joints, the surface of the concrete previously placed (including vertical, inclined, and substantially horizontal areas) shall be thoroughly cleaned of foreign materials and laitance, if any, and then roughened.
- B. The previously placed concrete at the joint shall be free of standing water.
- C. Waterstops shall be used on all construction joints below water level.

### **3.3 CURING AND PROTECTION**

- A. All concrete, particularly slabs and including finished surfaces, shall be treated immediately after concreting or cement finishing is completed, to provide continuous moist curing for at least seven days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or kept moist by other acceptable means. Horizontal surfaces, slabs, etc., shall be ponded to a depth of 1/2-inch wherever practicable, or kept continuously wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other acceptable means.
- B. For at least seven days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 45 degrees F. The methods of protecting the concrete shall be subject to the review of the Engineer.
- C. No manure, salt, or other chemicals shall be used for protection.
- D. The above mentioned 7-day periods may be reduced to 3 days in each case if high-early-strength cement is allowed to be used in the concrete.
- E. Wherever practicable, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

### **3.4 TRIMMING AND REPAIRS**

- A. The Contractor shall use suitable forms, mixture of concrete, and workmanship so that concrete surfaces, when exposed, will not require patching. Concrete which, in the opinion of the Engineer has excessive honeycomb, aggregate pockets, or depressions will be rejected and the Contractor shall, at his own expense remove the entire section containing such defects and replace it with acceptable concrete.
- B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled and surface defects which do not impair structural strength shall be repaired.
- C. Defective concrete shall be cut perpendicular to the surface until sound concrete is reached, but not less than 1-inch deep. The remaining concrete shall be thoroughly roughened and cleaned. Concrete around the cavity or the form tie recess shall be thoroughly wetted and promptly painted with a 1/16-inch brush coat of neat cement mixed to the consistency of thick paint. The hole shall then be filled with mortar.
- D. Mortar shall be 1:1-1/2 cement and sand mix with sufficient white cement, or fine limestone screening in lieu of sand, to produce a surface matching the adjoining work. Cement and sand shall be from the same sources as in the parent concrete.
- E. Mortar in patches shall be applied so that after partial set it can be compressed and rubbed to produce a finish flush and uniform in texture with the adjoining work. All patches shall be warm-moist cured as above specified.
- F. The use of mortar patching as above specified shall be confined to the repair of small defects in relatively green concrete. If substantial repairs are required, the defective portions shall be cut out to sound concrete and the defective concrete replaced by means of a cement gun, or the structure shall be taken down and rebuilt, all as the Engineer may decide or direct.

### **3.5 FINISHES**

- A. Exposed to View Concrete Surfaces:
  - 1. All concrete exposed to view in the completed structure shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of ACI shall apply to all exposed to view concrete surfaces (limited to 1 foot below grade and 1 foot below the minimum liquid level for structures that will contain liquids).
  - 2. Forms for exposed concrete surfaces shall be exterior grade, high density overlay plywood, steel, or wood forms with smooth tempered hard board form liners.

3. Forms shall be coated with Nox-Crete Form Coating Release Agent, Debond Form Coating by L & M Construction Chemicals, Inc. or an approved equivalent, before initial pour and between subsequent pours, in accordance with the manufacturer's printed instructions. Form boards shall not be wet with water prior to placing concrete.
  4. Recessed joints in concrete shall be formed using lacquer coated wooden battens or forms, milled to indicated profiles. Battens and corner strips shall be carefully inspected before concrete is placed and damaged pieces replaced.
  5. Chamfer strips shall be 1-inch radius with leg, polyvinyl chloride strips by Gateway Building Products, Saf-T-Grip Specialties Cor., Vinylex Corp., or equivalent.
  6. Particular attention is directed to the requirements of ACI 301. Form panels shall be provided in the maximum sizes compatible with the form joints. Wherever practicable, form joints shall occur at recessed joints. All form joints in exterior exposed to view surfaces shall be carefully caulked with an approved nonstaining caulking compound. Joints shall not be taped. Form oil or other material which will impart a stain to the concrete shall not be allowed to contact concrete surfaces.
  7. Care shall be taken to prevent chipping of corners or other damage to concrete when forms are removed. Exposed corners and other surfaces which may be damaged by ensuing operations shall be protected from damage by boxing, corner boards or other approved means until construction is completed.
  8. Form ties shall remain in the walls and shall be equipped with a waterseal to prevent passage of water through the walls. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends to tie wires project toward or touch formwork. Minimum set back of form ties shall be 1 inch from faces of wall. The hole left by removal of tie ends shall be sealed and grouted as per ACI and in accordance with procedure described hereinafter. Form ties will be permitted to fall within as cast areas of architecturally treated wall surfaces; this does not apply to walls receiving textured decorative waterproof masonry coating.
  9. All formed exposed to view concrete shall be prepared as required, then rubbed and coated with Thoroseal or other Engineer approved product. The manufacturer's recommendations for surface preparation, application procedures and rates, and temperature and moisture conditions shall be followed. Exterior vertical surfaces shall be finished to one foot below grade. Interior exposed to view vertical surfaces of dry pits shall be finished full height, interior vertical surfaces of liquid containers shall be finished to one foot below the minimum liquid level that will occur during normal operations.
  10. Slope all slabs to prevent water pocketing.
- B. All vertical surfaces below minimum liquid level in liquid containing structures shall have a smooth form finish.
  - C. All smooth form concrete vertical surfaces shall be true plane within 1/4-inch in 10 feet as determined by a 10 foot straight edge place anywhere on the surface in any direction. Abrupt irregularities shall not exceed 1/8-inch.
  - D. Basin, flume, conduit and tank floors shall have a "troweled" finish unless shown otherwise on Drawings.
  - E. Weirs and overflow surfaces shall be given a troweled finish.
  - F. Exterior platforms, steps and landings shall be given a broom finish. Broom finish shall be applied to surfaces which have been steel troweled to an even smooth finish. The troweled surface shall then be broomed with a fiber bristle brush in the direction transverse to that of the main traffic.
  - G. Walking surfaces of slabs shall have a troweled finish unless shown otherwise on Drawings.
  - H. Patching of holes due to removal of tie ends and other repairable defective areas shall be as follows: Entire contact area of hole shall be coated with two part moisture insensitive epoxy bonding compound in accordance with manufacturer's specifications, and prior to placing of freshly mixed patching mortar. Patching mortar shall be mixed and placed in general accordance with ACI.

- I. Nox-Crete Harbeton, L & M Construction Chemicals Chem Hard, or an approved equivalent shall be applied to all exposed concrete floors in occupied spaces. The floors shall be thoroughly cured, cleaned, and perfectly dry with all work above them completed. The hardener shall be applied evenly and freely and in conformance with manufacturer's instructions, using not less than three (3) coats, allowing 24 hours between coats. One gallon of hardener shall cover not more than 100 square feet. After the final coat is completed and dry, surplus hardener shall be removed from the surface of the concrete by scrubbing and mopping with water.

### **3.6 CONCRETE WALKS AND CURBS:**

- A. Subgrade shall be true and well compacted at the required grades. Spongy and otherwise unsuitable material shall have been removed and replaced with properly compacted, approved material. Concrete walks shall be placed upon 4-inch crushed stone fill unless noted otherwise on the Drawings.
- B. Concrete walks shall be not less than 4 inches in thickness. Walks shall have contraction joints every 5 linear feet in each direction, formed in the fresh concrete by cutting a groove in the top surface of the slab to a depth of at least one-fourth the slab thickness with a jointing tool. Transverse expansion joints shall be installed at driveways, and opposite expansion joints in adjacent curbs. Where curbs are not adjacent, transverse expansion joints shall be installed at intervals of approximately 40 feet. Sidewalks shall receive a broomed finish. Scoring shall be in a transverse direction. Edges of the sidewalks and joints shall be edged with a tool having a radius not greater than 1/6-inch. Sidewalks adjacent to curbs shall have a slope of 1/4-inch per foot toward the curb. Sidewalks not adjacent to curbs shall have a transverse slope of 1/4-inch per foot or shall be crowned as directed by the Engineer. The surface of the concrete shall show no variation in cross section in excess of 1/4-inch in 5 feet. Concrete walks shall be reinforced with 6 x 6 - W1.4 x W1.4 welded wire fabric unless noted otherwise on the Drawings.
- C. Concrete curbs shall be constructed to the section indicated on the Drawings, and all horizontal and vertical curves shall be incorporated as indicated or required. Forms shall be steel or as approved by the Engineer. At the option of the Contractor, the curbs may be precast or cast-in-place. Cast-in-place curbs shall be divided into Sections 8 to 10 feet in length using steel divider plates. The divider plates shall extend through the concrete and shall be removed. Precast curbs shall be finished smooth. Dividers shall be installed where the curb crosses pipe trenches or other insecure area. Transverse expansion joints shall be installed at all curb returns and at intervals of approximately 40 feet.

### **3.7 WATERTIGHTNESS**

- A. The structures which are intended to contain liquids and/or will be subjected to exterior hydrostatic pressures shall be so constructed that when completed and tested, there shall be no loss of water and no wet spots shall show.
- B. As soon as practicable after the completion of the structures, the Contractor shall fill such structures with water and if leakages develop or wet spots show, the Contractor shall empty such structures and correct the leakage in an approved manner. Any cracks which appear in the concrete shall be dug out and suitably repaired. Temporary bulkheads over pipe openings in walls shall be provided as required for the testing.
- C. After repairs, if any are required, the structures shall be tested again and further repaired if necessary until satisfactory results are obtained. All work in connection with these tests and repairs shall be at the expense of the Contractor.

- D. Waterstops shall be placed in all locations as indicated on the Drawings and as may be required to assure the watertightness of all containers of liquids. Cut coil ends square (or at proper miter at corners). Waterstops shall be extended at least 6 inches beyond end of placement in order to provide splice length for subsequent placement. In slabs and tank bottoms, waterstops shall be turned up to be made continuous with waterstops at bottom of walls or in walls. All joints between adjacent, continuing, and intersecting sections of waterstop including butt joints, tee joints, and other angled joints shall be sealed with LEAKMASTER to form a watertight seal. Waterstops shall not be lapped. Waterstops shall be secured in place to maintain proper position during placement of concrete. Care shall be taken to avoid folding while concrete is being placed and to prevent voids in the concrete surrounding the waterstop. All materials shall be installed in accordance with the manufacturer's recommendations.
- E. Joints between pipe (except cast iron wall pipe) and cast-in-place concrete walls shall be sealed as required by the Drawings.
- F. The top surface of all concrete decks (except slabs on grade) shall be coated with Sikagard-70 water-repellant penetrating sealer as manufactured by the Sika Corporation, Nox-Crete Stifel, or another approved equivalent. The manufacturer's recommendations shall be followed in all areas of application.

### **3.8 GROUTING BASE PLATES, BEARING PLATES AND MACHINE BASES**

- A. Column base plates, bearing plates for beams and similar structural members, machinery and equipment bases shall, after being plumbed and properly positioned, be provided with full bearing on epoxy nonshrink grout, as described in Section 03610, Precision Grouting. Concrete surfaces shall be rough, clean, free of oil, grease and laitance and shall be moistened thoroughly immediately before grout is placed. Metal surfaces shall be clean and free of oil, grease and rust. Mixing and placing shall be in conformance with the material manufacturer's printed instructions.
- B. Grout fill which is formed in place by using rotating equipment as a screed, such as for clarifiers and similar types of equipment, shall be mixed in proportions and consistencies as required by the manufacturer or supplier of the equipment.

### **3.9 EQUIPMENT PADS**

- A. Unless otherwise shown or directed, all equipment and items such as lockers, motor control centers, etc., shall be installed on concrete bases. The bases shall be constructed to the dimensions shown on the Drawings or as required to meet plan elevations. Where no specific plan elevations are required, the bases shall be 6 inches thick and shall extend 3 inches outside the equipment base. In general, the concrete bases shall be placed up to 1-inch below the base. The equipment shall then be properly shimmed to grade and the 1-inch void filled with nonshrink epoxy grout as described in Section 03610, Precision Grouting.

**END OF SECTION**

**SECTION 03348**  
**CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Concrete finishing and repair of surface defects.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 03100 – Concrete Formwork.
  - 4. Section 03310 – Cast In Place Structural Concrete.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Concrete Institute (ACI):
    - a. 116R, Cement and Concrete Terminology.
  - 2. ASTM International (ASTM):
    - a. C150, Standard Specification for Portland Cement.
    - b. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
    - c. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
    - d. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
    - e. D4259, Standard Practice for Abrading Concrete.
  - 3. Society for Protective Coatings/NACE International (SSPC/NACE):
    - a. SP 13/NACE No. 6, Surface Preparation of Concrete.
- B. Qualifications:
  - 1. Applicator of metallic aggregate topping, acrylic, or epoxy surfacer/filler must be approved, in writing, by manufacturer.
  - 2. Manufacturer of metallic aggregate topping, acrylic, or epoxy surfacer/filler shall have minimum of five (5) years experience in manufacturing of same with documented performance history for similar installations.
  - 3. Installer/applicator of metallic aggregate topping, acrylic, or epoxy surfacer/filler shall have minimum of three (3) years experience installing similar coatings and shall be licensed or approved in writing by manufacturer to install/apply this product.
  - 4. Applicator of concrete sealer, hardener, densifier shall be factory trained and approved, in writing, by the manufacturer to apply the product.
    - a. Applicator shall have a minimum of five (5) years experience successfully applying Mock-Ups:

**1.3 DEFINITIONS**

- A. Vertical Surface Defects:
  - 1. Any void in the face of the concrete deeper than 1/8 IN, such as:
    - a. Tie holes.
    - b. Air pockets (bug holes).
    - c. Honeycombs.
    - d. Rock holes.
  - 2. Scabbing:



- a. Scabbing is defect in which parts of the form face, including release agent, adhere to concrete.
  3. Foreign material embedded in face of concrete.
  4. Fins 1/16 IN or more in height.
- B. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  2. Installer and applicator are synonymous.
- C. Other words and terms used in this Specification Section are defined in ACI 116R.

#### **1.4 SUBMITTALS**

- A. Shop Drawings:
1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
  3. Certifications:
    - a. Certification of aggregate gradation.
    - b. Certification that products being used will not interfere with bonding of future floor or wall finishes.
- B. Miscellaneous Submittals:
1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with manufacturer's recommendations and requirements for materials used.

#### **1.6 WARRANTY**

- A. Provide warranty equal to specified manufacturer's standard warranty for all products used.

### **PART 2 - PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Chemical floor sealer (CS-1) (CS-3):
    - a. L & M Construction Chemicals, Inc.
    - b. Euclid Chemical Co.
    - c. Dayton Superior.
  2. Bonding agents:
    - a. Euclid Chemical Co.
    - b. BASF Admixtures, Inc.
    - c. L & M Construction Chemicals, Inc.

#### **2.2 MATERIALS**

- A. Chemical Floor Sealer CS-1:
1. Colorless low VOC water-based solution containing acrylic copolymers.
    - a. ASTM C1315, Class B, minimum 30 percent solids.
    - b. ASTM C309, Type 1.
    - c. Non-yellowing UV resistant.

- d. Capable of being painted after cured.
- 2. Similar to L & M Construction Chemicals, Inc., Dress and Seal WB 30.
- B. Bonding Agent:
  - 1. For use only on concrete surfaces not receiving liquid water repellent coating:
    - a. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
    - b. Euclid Chemical Co. "Flex-Con."
    - c. BASF Admixtures, Inc. "Acryl-Set."
    - d. L & M Construction Chemicals, Inc. "Everbond."
    - e. Thoro System Products "Acryl 60."
  - 2. For use only on concrete surface receiving liquid water repellent:
    - a. Non-acrylic base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
- C. Cement:
  - 1. ASTM C150, Type II Portland for areas exposed to sewage.
  - 2. ASTM C150, Type I Portland elsewhere.
- D. Aggregate:
  - 1. Sand: Maximum size #30 mesh sieve.
  - 2. For exposed aggregate finish surfaces: Same as surrounding wall.
- E. Water: Potable.
- F. Non-Shrink Grout: See Specification Section 03100 and Specification Section 03310.

## 2.3 MIXES

- A. Bonding Grout: One (1) part cement to one (1) part aggregate.
- B. Patching Mortar:
  - 1. One (1) part cement to two and one-half (2-1/2) parts aggregate by damp loose volume.
    - a. Substitute white Portland cement for a part of gray Portland cement to produce color matching surrounding concrete.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. For methods of curing, see Specification Section 03370.
- B. Preparation of Bonding Grout Mixture:
  - 1. Mix cement and aggregate.
  - 2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
  - 3. Add bonding agent/water mixture to cement/aggregate mixture.
  - 4. Mix to consistency of thick cream.
  - 5. Bonding agent itself may be used as bonding grout if approved by manufacturer and Engineer.
- C. Preparation of Patching Mortar Mixture:
  - 1. Mix cement and aggregate.
  - 2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
  - 3. Add only enough bonding agent/water mixture to cement/aggregate mixture to allow handling and placing.
  - 4. Let stand with frequent manipulation with a trowel, until mix has reached stiffest consistency to allow placement.

- D. Clean surfaces in accordance with ASTM D4258 to remove dust, dirt, form oil, grease, or other contaminants prior to abrasive blasting, chipping, grinding or wire brushing.
  - 1. Abrasive blast surfaces in accordance with ASTM D4259 and SSPC SP13/NACE No. 6 to completely open defects down to sound concrete and remove laitance.
    - a. If additional chipping or wire brushing is necessary, make edges perpendicular to surface or slightly undercut.
    - b. No feathered edges will be permitted.
  - 2. Rinse surface with clean water and allow surface water to evaporate prior to repairing surface defects.
- E. Repairing Surface Defects:
  - 1. This method of repairing surface defects is to be used only on vertical concrete surfaces, in tanks containing water, surfaces to receive liquid water repellent and exterior surfaces.
  - 2. Fill and repair using patching mortar mix specified in Article 2.3.
    - a. Use non-shrink grout to fill tieholes as outlined in this Specification Section.
  - 3. If required by bonding agent manufacturer, etch surfaces with a muriatic acid solution followed by a thorough rinse with clean water.
    - a. Test concrete to determine pH level and continue flushing with clean water until surface pH is within acceptable limits.
  - 4. Dampen area to be patched and an area at least 6 IN wide surrounding it prior to application of bonding grout.
  - 5. Brush bonding grout into the surface after the surface water has evaporated.
  - 6. Allow bonding grout to set for period of time required by bonding agent manufacturer before applying premixed patching mortar.
  - 7. Fill tie holes with non-shrink non-metallic grout.
    - a. Where exposed to view and scheduled to receive concrete Finish #2 or #5, hold grout below surface of concrete and fill with patching mortar to match surrounding concrete.
  - 8. Fill all other defects with patching mortar.
    - a. Match color of surrounding wall.
    - b. Do not use acrylic bonding agent in patching mortar for filling defects in surfaces to be treated with liquid water repellent.
  - 9. Consolidate grout or mortar into place and strike off so as to leave patch slightly higher than surrounding surface.
  - 10. Leave undisturbed for at least 60 minutes before finishing level with surrounding surface.
    - a. Do not use metal tools in finishing a patch in a formed wall which will be exposed or coated with other materials.
  - 11. Keep areas damp in accordance with grout manufacturer or bonding agent manufacturer's directions.

### **3.2 INSTALLATION AND APPLICATION**

- A. Do not repair surface defects or apply wall or floor finishes when temperature is or is expected to be below 50 DegF.
  - 1. If necessary, enclose and heat area to between 50 and 70 DegF during repair of surface defects and curing of patching material.
    - a. Use only clean fuel, indirect fired heating apparatus.
- B. Chemical Floor Sealer Application:
  - 1. Apply to floor areas indicated on the Drawings in accordance with manufacturer's recommendations.
  - 2. Apply at rate recommended by manufacturer.
  - 3. After final coat of material is applied, remove surplus in accordance with manufacturer's recommendations.
  - 4. Do not apply sealer to floors scheduled to receive epoxy floor finish.
- C. Concrete Finishes for Vertical Wall Surfaces:
  - 1. General: Give concrete surfaces finish as specified below after removal of formwork and repair of surface defects.

2. Finish #1 - As cast rough form finish:
    - a. Selected forming materials are not required.
    - b. Prepare surface in accordance with Article 3.1 and repair the following surface defects:
      - 1) Tie holes.
      - 2) Honeycombs deeper than 1/4 IN.
      - 3) Air pockets deeper than 1/4 IN.
      - 4) Rock holes deeper than 1/4 IN.
    - c. Chip or rub off fins exceeding 1/4 IN in height.
    - d. Use at unexposed surfaces such as foundations and backfilled surfaces of walls not to be waterproofed.
  3. Finish #2 - As cast form finish:
    - a. Form facing material shall produce a smooth, hard, uniform texture.
      - 1) Use forms specified for surfaces exposed to view in accordance with Specification Section 03100.
    - b. Prepare surface in accordance with Article 3.1 and repair the following surface defects:
      - 1) Tie holes.
      - 2) Honeycombs deeper than 1/4 IN or larger than 1/4 IN DIA.
      - 3) Air pockets deeper than 1/4 IN or larger than 1/4 IN DIA.
      - 4) Rock holes deeper than 1/4 IN or larger than 1/4 IN DIA.
      - 5) Scabbing.
    - c. Chip or rub off fins exceeding 1/8 IN in height.
      - 1) Finish shall provide uniform color and texture.
    - d. Provide this finish for:
      - 1) Inside walls of wet wells, basins, clarifiers, trickling filters, tanks, and manholes, refuse pit walls, pipe trenches.
      - 2) Walls being waterproofed.
      - 3) Exposed surfaces not specified to receive another finish.
  4. Finish #5 - Smooth form finish:
    - a. Form facing material shall produce a smooth, hard, uniform texture.
      - 1) Use forms specified for surfaces exposed to view in accordance with Specification Section 03100.
    - b. Prepare surface in accordance with Article 3.1 and repair the following surface defects:
      - 1) Tie holes.
      - 2) Honeycombs, air pockets, rock holes and other holes deeper than 1/16 IN or larger than 1/16 IN DIA.
      - 3) Scabbing.
    - c. Chip or rub off fins exceeding 1/16 IN in height.
    - d. Provide this finish for:
      - 1) All surfaces which are to be painted, are to receive tank linings or are to remain exposed to view.
    - e. Construct mock-up per Article 1.2.
- D. Related Unformed Surfaces (Except Slabs):
1. Strike smooth and level tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces after concrete is placed.
  2. Float surface to a texture consistent with that of formed surfaces.
    - a. If more than one (1) finish occurs immediately adjacent to unformed surface, provide surface with most stringent formed surface requirement.
  3. Continue treatment uniformly across unformed surfaces.
- E. Concrete Finishes for Horizontal Slab Surfaces:
1. General:
    - a. Tamp concrete to force coarse aggregate down from surface.
    - b. Screed with straightedge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains.
    - c. Dusting of surface with dry cement or sand during finishing processes not permitted.
  2. Unspecified slab finish:

- a. When type of finish is not indicated, use following finishes as applicable:
  - 1) Surfaces intended to receive bonded applied cementitious applications: Scratched finish.
  - 2) Surfaces intended to receive roofing, or waterproofing membranes: Floated finish.
  - 3) Floors and roof surfaces which are future floors intended as walking surfaces or for reception of floor coverings: Troweled finish.
  - 4) Garage floors and ramps: Broom or belt finish.
  - 5) Exterior slabs, sidewalks, platforms, steps and landings, and ramps, not covered by other finish materials: Broom or belt finish.
  - 6) All slabs to receive a floated finish before final finishing.
3. Scratched slab finish: After concrete has been placed, consolidated, struck off, and leveled to a Class B tolerance, roughen surface with stiff brushes or rakes before final set.
4. Floated finish:
  - a. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
  - b. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operations.
    - 1) Use wood or cork float.
  - c. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two (2) different angles.
  - d. Cut down all high spots and fill all low spots to produce a surface with Class B tolerance throughout.
  - e. Refloat slab immediately to a uniform texture.
5. Troweled finish:
  - a. Float finish surface to true, even plane.
  - b. Power trowel, and finally hand trowel.
  - c. First troweling after power troweling shall produce a smooth surface which is relatively free of defects, but which may still show some trowel marks.
  - d. Perform additional trowelings by hand after surface has hardened sufficiently.
  - e. Final trowel when a ringing sound is produced as trowel is moved over surface.
  - f. Thoroughly consolidate surface by hand troweling.
  - g. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
  - h. On surfaces intended to support floor coverings, remove any defects that would show through floor covering by grinding.
6. Broom or belt finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom or burlap belt across surface.
7. Underside of concrete slab finish:
  - a. Match finish as specified for adjacent vertical surfaces.
  - b. If more than one (1) finish occurs immediately adjacent to underside of slab surface, provide surface with most stringent formed surface requirement.

### 3.3 FIELD QUALITY CONTROL

- A. Horizontal slab finishes will be accepted provided:
  1. Applicable specification requirements are satisfied.
  2. Water does not pond in areas sloped to drain.
  3. Gap between a 10 FT straightedge placed anywhere and the finished surface does not exceed:
    - a. Class A tolerance: 1/8 IN.
    - b. Class B tolerance: 1/4 IN.
    - c. Class C tolerance: 1/2 IN.
  4. Accumulated deviation from intended true plane of finished surface does not exceed 1/2 IN.
  5. Accuracy of floor finish does not adversely affect installation and operation of movable equipment, floor supported items, or items fitted to floor (doors, tracks, etc.).

- B. Unacceptable finishes shall be replaced or, if approved in writing by Engineer, may be corrected provided strength and appearance are not adversely affected.
  - 1. High spots to be removed by grinding and/or low spots filled with a patching compound or other remedial measures to match adjacent surfaces.

#### **3.4 PROTECTION**

- A. All horizontal slab surfaces receiving chemical floor sealer shall be kept free of traffic and loads for minimum of 72 HRS following installation of sealer.

**END OF SECTION**

**SECTION 03370**  
**CONCRETE CURING**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Concrete curing materials and methods.

**1.2 RELATED WORK**

- A. Section 03310 - Structural Concrete.

**1.3 REFERENCES**

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- C. ASTM D2103 - Polyethylene Film and Sheeting.
- D. FS TT-C-800 - Curing Compound, Concrete for New and Existing Surfaces.

**1.4 QUALITY ASSURANCE**

- A. Conform to requirements of ACI 301.

**1.5 SUBMITTALS**

- A. Submit manufacturer's product data and installation instruction in accordance with the requirements of Section 01300.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Water: Clean and not detrimental to concrete curing.
- B. Absorptive Mat: Burlap fabric of clean, roll goods.
- C. Membrane Curing Compound: Clear finish, conforming to ASTM C-309, Type 1-D, Class A or B.
- D. Impervious sheet conforming to ASTM C-171, polyethylene film shall be white opaque.

**PART 3 - PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Protect freshly placed concrete from premature drying and excessive temperatures. Begin curing immediately after free water has disappeared from exposed surface. Keep exposed surface continuously moist for not less than seven (7) days.

**3.2 MEMBRANE CURING COMPOUND**

- A. Apply curing compound in two (2) coats with second coat at right angles to the first.
- B. Apply in accordance with manufacturer's instructions.

### **3.3 SPRAYING**

- A. Spray water over slab areas; maintain continuously moist for seven (7) days.

### **3.4 ABSORPTIVE MAT**

- A. Spread absorptive mat over slab areas. Lap edges and ends 12 inches. Spray with water until mat saturation. Maintain saturation for seven (7) days.

### **3.5 CURING COMPOUNDS**

- A. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.
- B. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing compound.

**END OF SECTION**



**HDR**

**D I V I S I O N 4**

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Masonry (Not Used)

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**HDR**

**D I V I S I O N 5**

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**Metals**

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**SECTION 05120**  
**STRUCTURAL STEEL**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Provide structural steel for building construction including sub-framing units which are part of the general framing system. Include anchors, bases, bearing plates, bracing, lintels when part of structural framing, and detail fittings.
- B. Modify existing structural steel systems and components to accommodate remodeling and new work.

**1.02 SUBMITTALS**

Submit for approval shop drawings, product data, test reports.

**1.03 QUALITY ASSURANCE**

Comply with governing codes and regulations. Provide products of acceptable manufacturers. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Steel wide flange shapes: ASTM A 992, grade 50. All other shapes, plates and bars: ASTM A 36, or ASTM A 572, Grade 50.
- B. Steel pipe: ASTM A 53.
- C. Anchor bolts: ASTM A 307.
- D. High strength threaded fasteners: ASTM A 325.
- E. Non-metallic shrinkage resistant grout; Euclid Euco NS, L&M Crystex, Sonneborn Sonnegrout or approved equal. Compressive strength suited for project requirements.
- F. Shop finish for structural steel in accordance to Section 09800.
- G. Galvanized shapes, including lintels: Hot dip galvanized ASTM A 123.
- H. Welding: AWS D1.1.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Comply with AISC codes and specifications, and with AWS "Structural Welding Code".

- B. Employ a registered engineer to check elevations and plumb and level tolerances; certify that installed work is within AISC Standards. Owner may engage testing/inspection agency to inspect welded and bolted connections.
- C. Architecturally exposed steel: Fabricate with special care using materials carefully selected for best appearance. Store materials off ground and keep clean. Cut, fit and assemble work with surfaces smooth, square and with complete contact at joints. Set all cambers up. Weld all work continuously; grind smooth and flush to make seams invisible after priming. Prepare surfaces to comply with SSPC-SP6; apply prime coat within 24 hours after cleaning.
- D. Touch-up field welds and abraded areas in accordance with Section 09800.

**END OF SECTION 05120**

**SECTION 05500**  
**MISCELLANEOUS METALS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Provide all labor, materials, equipment and service necessary for fabrication and erection of structural steel and aluminum and for fabrication and installation of miscellaneous non-ferrous metals as shown on the Drawings and not specifically included under other sections of these Specifications.
  - 1. Erection.
  - 2. Shop and Erection Drawings.
  - 3. Shop Painting.
  - 4. Galvanizing.
  - 5. Aluminum Work Protection.
  - 6. Cleaning Aluminum Work.
  - 7. Miscellaneous Items.
  - 8. Aluminum Pipe Railing.
  - 9. Aluminum Stairs.
  - 10. Ladders.
  - 11. Cast Aluminum Nosings.
  - 12. Access Doors.
  - 13. Castings.
  - 14. Miscellaneous Framing and Supports.

**1.2 RELATED WORK**

- A. Section 05530 - Aluminum Grating.

**1.3 REFERENCES**

- A. All work under this Section shall be governed by:
  - 1. Specifications for the design, fabrication and erection of structural steel for buildings - American Institute of Steel Construction, current edition.
  - 2. Aluminum Construction Manual, Section 1, Specifications for Aluminum Structures - the Aluminum Association.
  - 3. All welding shall conform to the latest code of the American Welding Society.
  - 4. ASTM A-276.
  - 5. ASTM A-325.
  - 6. ASTM F-593, 294.
  - 7. Federal Specification FF-S-325.
  - 8. ASTM A-48.
  - 9. Federal Specification TT-V-51F.
  - 10. ANSI B94.12.
  - 11. ASTM A-12, A-153, A-384, A-563 and A-780.
  - 12. SSPC SP-1, SP-2, SP3, SP-7.

**1.4 SUBMITTALS**

- A. As required by the Specifications, the Contractor shall submit for review completely detailed and certified shop and erection drawings of the miscellaneous metal work. All coatings or other protection against corrosion to be applied at the shop or in the field shall be indicated on these drawings. The shop drawings for aluminum work shall show the alloys and tempers to be used, and the finish, if any to be applied.

- B. Shop drawings, giving complete information necessary for fabrication, layout and installation of metal work shall be submitted to the Engineer for review prior to fabrication.
- C. Preparation of shop drawings for fabricated metal items shall be coordinated by the Contractor with the manufacturers of various equipment in order to comply with details, locations, openings, and arrangements required by the manufacturers.
- D. Field measurements shall be made to verify all dimensions in the field which may affect installation of work before shop drawings are made and/or fabrication is performed.

## **1.5 QUALITY ASSURANCE**

- A. The design, detail and workmanship of steel plates and structural steel shall conform to the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
- B. Where welding is permitted or required, it shall conform to the current requirements of the American Welding Society for the type of work in question.
- C. Aluminum work shall be fabricated in a shop where the quality of work is in accordance with the highest standards for work of this type. All work shall be executed by mechanics skilled in the fabrication of aluminum, and shall be true to detail with sharp, clean profiles, fitted with proper joints and intersections and with finishes as specified.
- D. All miscellaneous metal work shall be formed to shape and size with sharp lines and angles. Shearing and punching shall leave clean true lines and surfaces.

## **1.6 RESPONSIBILITY FOR DIMENSIONS**

- A. The general design and dimensions of the miscellaneous metal work are indicated on the Drawings, but the Contractor shall be responsible for the correctness of the details and dimensions of the finished articles. He shall verify conditions at the job before fabrication and coordinate the work with that of all other trades to prevent interference.

# **PART 2 - PRODUCTS**

## **2.1 MATERIALS**

- A. Steel plates and structural steel shapes shall conform to ASTM Standard Specification for Structural Steel, Designation A36.
- B. Sheet steel shall be cold rolled or hot rolled carbon sheet steel conforming to ASTM Standard Specification for Steel, Carbon, Cold Rolled Sheet, Commercial Quality, Designation A36 or ASTM Standard Specification for Steel, Carbon (0.15 maximum, percent), Hot Rolled Sheet and Strip, Commercial Quality, Designation A569, as appropriate.
- C. Steel pipe shall conform to ASTM Standard Specifications for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless, Designation A53.
- D. Stainless steel shall be Type 316 unless otherwise indicated or specified.
- E. Aluminum work shall be fabricated of plates, rolled or extruded shapes, sheets or casting conforming (unless otherwise permitted or indicated) to the following alloy and temper designations of the Aluminum Association:
  1. Structural rolled or extruded shapes 6061-T6.
  2. Extruded shapes 6063-T5.
  3. Plates 6061-T6.
  4. Gratings (bearing bars) 6061-T6 (crimp bars) 6063-T6.
  5. Castings 214.
  6. Sheets 3003-F.
  7. Bolts and nuts 2024-T4.
  8. Pipe Railing 6063-T6.

- F. The Contractor shall furnish the Engineer with mill certificates and a signed statement from the fabricator that all aluminum work furnished is of the proper alloys, as specified above.

## **2.2 STEEL**

- A. Structural steel shall conform to the requirements of ASTM A-36. Structural tubing, where used, shall conform to the requirements of ASTM A-500, Grade B, and the ends of the tubing shall be properly sealed to protect the internal surfaces. Steel anchor bolts shall be ASTM A-36 hot rolled threaded rod or bar stock, except where stainless steel is indicated on the Drawings.
- B. Structural steel members as required shall conform to ASTM Standard shapes.
- C. Base and bearing plates shall be provided where necessary to provide maximum bearing value of not more than 200 psi on solid concrete masonry units not more than 750 psi on concrete and shall be grouted in place.
- D. Steel lintels shall be provided for all square head openings in masonry where shown and where other lintels are not indicated on the Drawings. Lengths of bearing at each end of lintels shall be not less than 1 inch per foot of span, but in no case less than 8 inches shall be increased or the lintels shall be fitted with bearing plates as required to provide unit pressures in pounds per square inch of not more than 200 on solid concrete masonry units and 625 on concrete. All new steel lintels shall be hot-dipped galvanized. Finish coats are specified in Division 9 - Finishes.

## **2.3 SHOP PAINTING**

- A. Painting of miscellaneous ferrous metal work is specified under Division 9.

## **2.4 GALVANIZING**

- A. Items of miscellaneous iron work and steel work indicated on the Drawings or specified to be galvanized shall be zinc coated by the hot dip process in conformity with ASTM Standard Specification for Zinc (hot galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123-78; or ASTM Standard Specifications for Zinc Coating (hot-dip) on Iron and Steel Hardware, Designation A153-78, as appropriate. Galvanizing is specified under Article 3.04, "Hot-Dip Galvanizing".

## **2.5 ALUMINUM**

- A. All structural and miscellaneous aluminum shall be Alloy 6061 (Alloy 6063 for extrusions), Temper T6, unless otherwise noted, indicated or accepted by the Engineer. Where welding is necessary in fabrication, it shall be done in conformance with Section 7 "Welded Construction" of Specification for Aluminum Structures, referenced hereinbefore.

## **2.6 ALUMINUM WORK PROTECTION**

- A. Aluminum surfaces which after erection would otherwise be in contact with concrete or brick masonry or with mortar, shall be protected from contact therewith by a coat of bitumastic super service black manufactured by the Koppers Company, Inc., Pittsburgh, PA; Tarmastic 100 manufactured by Porter Coating Division, Porter Paint Company, Louisville, KY; 450 Heavy Tnemecol manufactured by Tnemec Company, North Kansas City, MO; or an acceptable equivalent product. Areas where the paint has been damaged by abrasion or other cause shall be cleaned and repainted as directed so that the aluminum will have a complete protective paint film when brought into contact with the material against which it is being protected. Before application of coating, the surface shall be cleaned of all dirt, heavy deposits of grease or oil, and other foreign substances and shall be immersed in or swabbed with an acceptable solvent. Next the surfaces shall be rinsed with clear water and thoroughly dried.
- B. The Contractor's attention is directed to the requirements of the Specifications in regard to protection against electrolysis where aluminum is to be used in conjunction with dissimilar metals.

- C. Where a shop coating of methacrylate lacquer has been specified on aluminum work to protect the surface from stain, the protective coating of lacquer worn off during handling or erection shall be replaced in the field by a new coating of lacquer of the same type.
- D. During construction, care shall be taken to prevent damage to the aluminum work from splashing or the accumulation of paint, concrete, mortar, or other similar materials.

## 2.7 STAINLESS STEEL

- A. Stainless steel shapes shall be ANSI Type 304 or 316 in accordance with ASTM A-276. Miscellaneous bar stock products such as pipe straps shall be 400 Series stainless steel. Anchor bolts, nuts and washers shall be ANSI Series 300 stainless steel.

## 2.8 FASTENERS

- A. Bolts, Nuts and Washers:
  - 1. Structural bolts shall be high strength ASTM A-325, Type 1, galvanized and galvanized ASTM A-325 hardened flat washers and galvanized ASTM A-325 hex nuts. Galvanized bolts, nuts and washers shall be centrifugally spun after galvanizing. Nuts shall have threads tapped oversize after galvanizing. All stainless steel bolts, nuts and washers shall be ANSI Type 300 Series stainless steel in accordance with ASTM F-593, with ASTM F-594 nuts. All bolts shall have hexagonal heads.
  - 2. Anchors and bolts including nuts and washers shall be provided where necessary for securing the work in place. Sizes, types and spacings of anchors and bolts not indicated or specified otherwise shall be as necessary for their purposes. Anchor bolts and anchors for the erection of structural steel shall be galvanized. Anchored bolts, nuts, and washers for all other uses including, but not limited to, underwater use and for the installation of equipment, piping, pumps and motors shall be stainless steel Type 304.
- B. Expansion Anchors (In Concrete):
  - 1. Expansion anchors shall be of two (2) types:
    - a. Stainless steel wedge type.
    - b. Self drilling plated type with stainless steel bolt and stainless steel washer.
  - 2. Type of expansion anchor desired shall be noted on Drawings.
  - 3. Stainless steel wedge type anchors shall be ITW Ramset/Red Head or approved equal of Type 303 stainless steel. Anchors shall meet or exceed latest Government GSA Federal Specifications FF-S-325, Group II, Type 4, Class 1. Anchor shall be used with 300 series stainless steel bolt and washer.
  - 4. Self drilling plated anchors shall be ITW Ramset/Red Head or approved equal. Anchors shall meet or exceed latest Government GSA Federal Specification FF-S-325, Group III, Type 1. Self-drilling anchors shall be electro-deposited zinc plated and chromate dipped, to meet or exceed the requirements of the latest Federal Specification QQ-Z-325, Type II, Class 3. Cutting teeth shall have minimum hardness of 82 Rockwell A scale.
  - 5. Stainless steel expansion anchors shall be installed in accordance with manufacturer's recommendations.
  - 6. Self-drilling expansion anchors shall be installed in accordance with manufacturer's recommendations. To insure full development strength, all self-drilling expansion anchors shall be expanded over the plug in the final set, by using a bolt screwed into the female threads and impacted by hand with a suitable hammer. The final set shall not be accomplished by using the drilling tool.
  - 7. After installation, pull-out tests by the anchor manufacturer's representative may be requested by the Engineer. If so, the Engineer's Resident Representative will stipulate the number and location of the tests.

## 2.9 MISCELLANEOUS ITEMS

- A. Items of miscellaneous metal work not particularly specified hereinafter shall be of the shape, size, material and details indicated on the Drawings or suitable for the purpose intended.



## **2.10 ALUMINUM PIPE RAILING**

- A. The aluminum pipe railing shall be the product of company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.
- B. Handrails and stair rails shall be designed to withstand a 200-pound concentrated load applied in any direction at any point on the top rail. Handrails and stair rails shall also be designed to withstand a load of 50 lbs/ft. applied horizontally to the top rail. The 200-pound load will not be applied simultaneously with the 50 lbs/ft. load. In addition, the handrails shall be designed to withstand a load of 100 lbs/ft. applied vertically downward to the top rail and simultaneously with the 50 lbs/ft. horizontal load. The 100 lbs/ft. vertical load does not apply to stair rails.
- C. The manufacturer shall submit calculations to the Engineer for approval. Testing of base castings or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.
- D. Post spacing shall be a maximum of 6 feet 0 inches. Posts and railings shall be a minimum of 1-1/2 inches Schedule 40 aluminum pipe alloy 6063-T6, ASTM-B-429 or ASTM-B-221. The handrail manufacturer shall show that their posts are of adequate strength to meet the loading requirements. If the manufacturer's posts are not of adequate strength, the manufacturer may reduce the post spacing or add reinforcing dowels or may do both in order to meet loading requirements.
- E. The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toe plate and pipe must be submitted for approval. Components that are glued or pop riveted at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Handrail and components shall be Thompson Fabricating Company or approved equal.
- F. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations. The top surface of the top railing shall be smooth and shall not be interrupted by projecting fittings.
- G. The midrail at a corner return shall be able to withstand a 200-pound load without loosening.
- H. Expansion bolts shall be spaced 10 diameters apart and 5-diameter edge distance for no reduction in pullout strength. A safety factor of four shall be used on expansion bolt pullout values published by the manufacturer. Expansion bolts shall be stainless steel type 303 wedge bolts.
- I. Toe plate shall conform to OSHA standards. Toe plate shall be a minimum of 4 inches high and shall be an extrusion that attaches to the posts with clamps which will allow for expansion and contraction between posts. Toe plates shall be set 1/4-inch above the walking surface. Toe plates shall be provided on handrails as required by OSHA and/or as shown on Drawings. Toe plates shall be shipped loose in stock lengths with pre-manufactured corners for field installation.
- J. Openings in the railing shall be guarded by a self-closing gate. Safety chains shall not be used unless specifically shown on the Drawings.
- K. Finish shall be Aluminum Association M10-C22-A41 (215-R1). The pipe shall be plastic wrapped. The plastic wrap is to be removed after erection.
- L. Aluminum surfaces in contact with concrete, grout or dissimilar metals will be protected with a coat of bituminous paint, mylar isolators or other approved material.

## **2.11 ALUMINUM STAIRS**

- A. The aluminum stairs shall have structural aluminum channel stringers and supports, aluminum tread plate treads and platforms and sheet aluminum risers as indicated on the Drawings and in the details.
- B. The treads shall be aluminum grating (see Section 05530). The treads shall be supported by and attached to 1-1/4 inch by 3/16 inch aluminum carrier angles bolted to the stringers. The treads shall be the widths indicated.

- C. All platforms shall be fabricated of 1/4-inches thick aluminum tread plate and shall be supported on the edges by structural aluminum angles and at the mid-spans by structural aluminum tees.
- D. The aluminum tread plate for treads and platforms shall have an acceptable nonskid pattern surface.
- E. The Contractor shall provide all structural aluminum angle hangers, struts, rod hangers, closure plates and brackets indicated or necessary to complete the stairs as indicated.
- F. Wheel guards shall be heavy duty concrete fill type, cast iron wheel guards, No. R-4983-C manufactured by Neenah Foundry Company; Type 706A manufactured by Flockhart Foundry Company; or an acceptable equivalent product. The guards shall be set 2 inches into the pavement and shall be bolted to the masonry walls. The guards shall be filled with Class A concrete and the top of the fill sloped at a 15 degree angle from the building.

## **2.12 CAST ALUMINUM NOSINGS**

- A. The cast aluminum nosing shall be abrasive cast aluminum nosings securely fastened with stainless steel, flat head bolts and wing anchors set into the fresh concrete. The nosings shall be the products of Wooster Products, Inc., Wooster, OH; American Abrasive Metals Company, Irvington, NJ; Andco Building Specialties, Division of Andco Industries Corporation, Greensboro, NC; or acceptable equivalent products.
- B. Cast aluminum nosings for concrete steps and platforms shall be of the widths indicated and shall be Type 101 made by Wooster Products, Inc.; Style A made by American Abrasive Metals Company; Style 801 made by Andco Building Specialties, or acceptable equivalent products.

## **2.13 FLOOR HATCHES AND FRAMES**

- A. The floor hatches and frames shall be flush floor hatches manufactured by the Bilco Company, New Haven, CT; Halliday Products, Orlando, FL; Babcock-Davis Associates, Inc., Arlington, MA; or acceptable equivalent product. The hatches shall be single leaf gutter type and of the sizes indicated on the Drawings. The hatches shall be factory assembled and shipped complete with frame for installation on the job. The hatches shall be furnished with hinges, hold open safety lock bars, and flush lift handles. Gutter type hatches shall have a 1-1/2 inch drainage coupling located in on corner of the channel frame. Locking system shall be Type 316 stainless steel slam lock with removable key.
- B. The floor hatches, frames, and all hardware shall be constructed of 316 stainless steel for all hatches larger than 24"x24". The covers shall be reinforced to be capable of withstanding a uniform live load of 300 psf. All hatches 24"x24" or smaller shall be constructed with aluminum hatches and 316 stainless steel hardware.

## **2.14 SAFETY CHAIN**

- A. Safety chain shall be 3/8-inch trade size, proof coil, welded, polyester coated, low carbon steel in OSHA safety yellow designed for barrier chain application as manufactured by Campbell Chain Company, York, PA.

## **2.15 CASTINGS**

- A. All miscellaneous iron casting shall be of best quality materials free from flaws and unsightly defects. Gray cast iron shall be ASTM A-48 Class 35 (35,000 psi tensile strength). Furnish and install in the locations indicated casting of the type and size shown on the Drawings.

## 2.16 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide miscellaneous steel framing and supports as required to complete the work. Fabricate miscellaneous units to the sizes, shapes, and profiles shown or if not shown, of the required dimensions to receive adjacent grating plates, louvers, vents, grilles, screens or other work to be retained by the framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars of all welded construction using mitered corners, welded brackets and splice plates and a minimum number of joints for field connection. Cut, drill and tap units to receive hardware and similar items to be anchored to the work.

## 2.17 PORTABLE HOIST SYSTEM SLEEVE DAVIT BASES

- A. General:
  - 1. **All safety devices must be able to withstand, without failure, a drop test consisting of a 500-pound weight dropping 18 inches.**
- B. Hoist System Mast Sleeve Davit Bases:
  - 1. Welded stainless steel sleeve, wall-mount design, with anchors for new concrete construction. DBI Sala UCL wall-mounted sleeve davit base model number 8518348, or approved equal.
  - 2. Welded stainless steel sleeve, flush-mount design, with anchors for new concrete construction. DBI Sala UCL flush-floor-mounted sleeve davit base model number 8510316, or approved equal.
  - 3. All sleeve davit bases must be compatible with the Owner's existing DBSI Sala UCL advanced series hoist model number 8518040 mast.
  - 4. Stainless steel cap required for each sleeve to be in place when sleeve is not in use.
  - 5. All sleeve davit bases must allow for 360 degree mast rotation and be rated for a 450lb working load.

## 2.18 ACCESS WALKWAYS AND SUPPORT STRUCTURES

- A. All rolled structural components for the walkways/flocculator support structures shall be constructed rolled steel per section 2.2 of these specifications and factory coated per section 09905 for steel used in open air environments.
- B. Structural components that are to be field assembled shall be assembled through bolted construction. Any welded connections shall be performed in the factory and factory coated per these specifications.
- C. All walkway gratings shall be constructed of aluminum per section 05530.
- D. All bolts, hardware and fasteners shall be 304 or 316 stainless steel unless otherwise noted.
- E. Handrails shall be provided as depicted in the contract drawings and conform to these specifications.
- F. It is understood that flocculators vary in size and configuration. Therefore, the flocculator manufacturer shall specify the dimensions of the enlarged flocculator drive working platforms to allow for 24 inches minimum clear space around the flocculator drive units for ease of access during operation and maintenance. The dimensions shown on the drawings for these "working platforms" are estimations to provide the manufacturer with general sizing information of the platforms.
- G. All flocculator support structures shall be free span structures and bear on the concrete walls of each flocculation stage basin as depicted on the contract drawings. No intermediate column supports will be allowed within the flocculation zone.
- H. All walkways and support structures required to support and access the flocculation equipment shall be designed and furnished by the flocculation equipment manufacturer or structural engineering subcontractor thereof and must be licensed in the state of Kentucky.

## **PART 3 - EXECUTION**

### **3.1 ANCHORAGE ITEMS**

- A. The Contractor shall furnish all bolts, nuts, shims, pins, screws, straps, nails and other anchors which may be required by the Drawings or job conditions to secure all items permanently in place whether or not specifically called for or shown on the Drawings.

### **3.2 FABRICATION AND INSTALLATION OF METAL WORK**

- A. General: All metal items shall be accurately fabricated and erected with exposed joints close fitting. All joints shall be of such character and so assembled that they will be as strong and rigid as adjoining sections. Joints shall be located where least conspicuous. Items shall have smooth finished surfaces except where otherwise shown or specified.
- B. Built-in Items: Members or parts to be built-in with masonry or concrete shall be in a form affording a suitable anchorage or shall be provided with approved anchors, expansion shields or other approved means of securing members.
- C. Dissimilar Metals: Ferrous and non-ferrous metals shall be insulated at all contacts with felt washer, strips or sheets, bitumastic paints, or other acceptable means. All aluminum surfaces in contact with concrete shall be coated with two (2) coats of Federal Specification TT-V51F Asphalt Varnish, or approved equal.
- D. Connections:
  - 1. All required anchors, couplings, bolts, and nuts required to support miscellaneous metal work shall be furnished and installed as required.
  - 2. Weights of connections and accessories shall be adequate to safely sustain and withstand stresses and strains to which they will be normally subjected.
  - 3. Connections shall be bolted except where welding is called for in the Drawings. Bolts shall be 3/4-inch diameter unless noted or required otherwise.
- E. Expansion Anchors:
  - 1. Expansion anchors shall be installed in holes drilled into concrete with carbide tipped drill bits conforming to ANSI B94.12-1977, using a rotary impact hammer for 1/2-inch and 3/8-inch anchors. Hole depth shall equal or exceed the anchor manufacturer's minimum recommended embedment. Should hole depth equal anchor manufacturer's minimum recommended embedment, hole shall be cleaned out by air pressure. The minimum hole depth shall be per anchor manufacturer's recommendations. Contractor shall assure hole is perpendicular and conforms in size to anchor manufacturer's recommendation.
  - 2. Washer and nut shall be assembled on anchor so that the top of the nut is flush with the top of the anchor. Then the anchor shall be driven into the hole through the work until the washer bears against the work. The anchor shall be expanded in accordance with the manufacturer's recommendations.
  - 3. General: Provide stainless steel fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  - 4. Bolts and Nuts: Regular hexagon head type, stainless steel, Grade A.
  - 5. Lag Bolts: Stainless steel.
  - 6. Machine Screws: Stainless steel.
  - 7. Wood Screws: Stainless steel.
  - 8. Plain Washers: Stainless steel.
  - 9. Masonry Anchorage Devices: Stainless steel.
  - 10. Toggle Bolts: Stainless steel.
  - 11. Lock Washers: Stainless steel.

### **3.3 WELDING**

- A. Welding procedures, welders and welding operators, both for shop and field welding, shall be qualified and certified in accordance with the requirements of AWS D1.1 "Welding in Building Construction" of the American Welding Society. Manufacturer's and fabricator's shop drawings shall clearly show complete information and Contractor shall perform all field welding in conformance with this information regarding location, type, size and length of all welds, all in accordance with AWS A2.0 "Standard Welding Symbols" of the American Welding Society. Special conditions shall be fully explained by notes and details.

### **3.4 HOT-DIP GALVANIZING**

- A. All fabrication, galvanizing and repair shall comply with ASTM Standards as they apply in accordance with the publication "ASTM Standards for Materials Hot-Dip Galvanized after Fabrication, 1981" issued by American Hot-Dip Galvanizers Association, Inc. In particular, the following specific standards shall apply to work under this contract: ASTM A-123, A-153, A-384, A-385, A-563 and A-780.
- B. Items to be galvanized shall be fabricated in accordance with ASTM A-385-80.
- C. Galvanizing for fabricated steel items shall conform to ASTM A-123-78 and shall be done after fabrication. Steel assemblies shall be subject to safe guarding from warpage and distortion during galvanizing per ASTM A-384-76.
- D. Galvanizing for structural steel fasteners and hardware shall conform to ASTM A-153-80. Galvanized bolts, nuts and washers shall be centrifugally spun after galvanizing. Nuts shall have threads tapped oversize, after galvanizing, in accordance with ASTM A-563-80.
- E. Upon field erection, any damage measuring more than 1/10-inch wide shall be repaired with a zinc-based solder or zinc-rich paint in accordance with ASTM A-780-80. Marred, damaged, or uncoated areas 4 square inches and less shall be patched with a zinc-based solder to a thickness of 5 milligrams; areas greater than 4 square inches shall be patched with an organic zinc-rich paint to a dry film, Devcon Z, LPS Instant Cold Galvanized; or approved equal. The resident project representative shall determine the extent of damage which would require recoating.
- F. Items subject to distortion during transit, such as thin, curved members, etc., shall be stacked on edge and/or blocked to prevent radius change or other distortion while in transit to and from the galvanizing plant.

### **3.5 PAINTING**

- A. Painting of miscellaneous ferrous metal work is specified under Division 9.

### **3.6 MISCELLANEOUS METAL FABRICATIONS**

- A. Rough Hardware: Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 5.2. Fabricate items to sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
- B. Miscellaneous Steel Trim:
  - 1. Provide shapes and sizes for profiles shown. Except as otherwise indicated, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.
  - 2. Galvanize miscellaneous steel trim where indicated.

**END OF SECTION**

**SECTION 05530**  
**ALUMINUM GRATING**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Provide all labor, materials, equipment and services required to furnish and install metal bar grating where shown on the Drawings.

**1.2 RELATED WORK**

- A. Section 05500 - Miscellaneous Metal and Fasteners.

**1.3 REFERENCES**

- A. Design, fabrication and installation of grating shall be in accordance with the following standards:
  - 1. Standard Specifications and Voluntary Code of Practice in Metal Bar Grating Manual, Latest Edition, published by National Association of Architectural Metal Manufacturers, Chicago, IL (ANSI A-202.1).
  - 2. ASTM B-210.
  - 3. ASTM B-221.
  - 4. Federal Specification TT-V-51F.

**1.4 SUBMITTALS**

- A. Submit shop drawings to the Engineer for review before fabrication:
  - 1. Indicate areas to receive grating, grating details and dimensions, and material specifications.
  - 2. Show anchorage details and locations.
  - 3. Indicate coordination with equipment suppliers where openings for such equipment are required.

**PART 2 - PART 2 - PRODUCTS**

**2.1 DESIGN CRITERIA**

- A. Support uniform live load of 100 psf.
- B. Deflection not to exceed span of bearing bars (in inches) divided by 240.
- C. Maximum Fiber Stress: 12,000 psi.

**2.2 BASIC DESIGN**

- A. The gratings shall be pressure locked aluminum gratings. The bearing bars shall be 3/16-inch thick by the depths indicated in the grating span chart in the details. Bearing bar spacing shall be 1-1/8 inch face to face with crimp bars riveted on 7-inch centers. The gratings shall be fabricated in standard size sections and secured in place by at least four (4) approved removable-type fasteners per grating panel. The ends of each grating section shall be banded with bearing bars. The top surfaces of all crimp bars shall be serrated for a nonskid surface, and raised slightly above the top surfaces of the bearing bars.
- B. All openings for fixtures or pipes, which require the cutting of three main bars or more, shall be finished in a similar manner as the ends.

- C. Gratings in concrete shall have aluminum angle frames with mitered corners and with welded joints ground smooth where exposed. The frames shall have welded anchors and shall be set in the concrete as it is placed.
- D. Bearing and cross bars shall be flush at surface.
- E. All free and supported bar ends around perimeter and around cutouts shall be banded.
- F. Provide removable sections of grating with suitable end bearing where noted on the Drawings or otherwise required.
- G. The aluminum grating shall be as manufactured by Borden Metal Products Co., Elizabeth, NJ; or approved equivalent

## **2.3 MATERIAL**

- A. The materials for grating panels shall be as listed:
  - 1. Bearing Bars: ASTM B-221, 6061-T6 or 6063-T6, aluminum.
  - 2. Cross Bars: ASTM B-221 (extruded) or ASTM B-210 (drawn) aluminum.
  - 3. All steel fasteners used with aluminum grating shall be galvanized.
  - 4. Finish: Aluminum mill finish (as fabricated).
  - 5. Anchors: Saddle clips of manufacturer's standard design, galvanized.

## **PART 3 - PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Grating shall be fabricated as indicated by shop drawings, which have been revised to reflect actual field measurements.
- B. Grating shall be set with full and uniform end bearing to preclude rocking; do not use wedges or shims.
- C. Provide 1-inch minimum bearing with maximum erection clearance of 1/4-inch all around.
- D. Anchor grating with saddle clips in accordance with manufacturer's recommendations or as detailed on the Drawings.
- E. Provide cutouts for the passage of pipe, valve and equipment operators, conduit, stems and similar work; cutouts for circular obstructions shall be at least 2 inches larger in diameter than the obstruction.
- F. Protect all surfaces of angles and frames to be in contact with concrete or dissimilar metals with two (2) coats of Fed. Spec. TT-V-51F Asphalt Varnish.

### **END OF SECTION**

**HDR**

**D I V I S I O N 6**

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Woods and Plastics

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**SECTION 06600**  
**FIBERGLASS REINFORCED PLASTIC FABRICATIONS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. Provide all labor, materials, equipment and services required or necessary to furnish and install fiberglass reinforced plastic (FRP) ladders where shown on the drawings and as specified herein.

**1.2 RELATED DOCUMENTS**

- A. Contract drawings, including general drawings and addenda drawings.
- B. Division 1 Specification sections.
- C. Section 05500 - Miscellaneous Metals and Fasteners

**1.3 SUMMARY**

- A. This section includes specifications for the following fiberglass reinforced plastic items, assemblies, and fabrications:
  - 1. Ladders

**1.4 QUALITY ASSURANCE**

- A. All FRP products and fabrications shall be supplied by an experienced firm who has continually engaged in the manufacture and fabrication of fiberglass reinforced plastic. All suppliers must document a minimum of five years experience with similar projects with equal scope or design.
- B. The installing contractor shall: assure that all field dimensions are taken accurately and communicated properly to the FRP fabricator, that other trades will not affect a proper installation of the FRP, and that all manufacturer's instructions and recommendations are followed.
- C. No substitution of materials will be allowed unless they are submitted for review as alternates, and the Engineer approves their use.

**1.5 DESIGN REQUIREMENTS**

- A. OSHA - 29 CFR as it pertains to worker safety and walking-working surfaces for stairs, ladders, handrail, and platforms

**1.6 SUBMITTALS**

- A. Submit complete shop drawings and engineering data for all FRP materials and fabrications as required by this scope of work.
- B. Product data:
- C. Manufacturer's catalog data with load charts for all FRP gratings.
  - 1. Manufacturer's catalog data for all FRP structural shapes.
- D. Shop drawings:
  - 1. Shop drawings shall indicate all FRP materials required and include all dimensions, connections, fasteners, tolerances, assembly and installation details as required.
  - 2. Coordination with equipment suppliers shall be indicated on the shop drawings where openings for such equipment is required.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. All FRP materials shall be manufactured with (select either Isophthalic-Polyester or Vinylester) resins.
- B. All pultruded grating and structural shapes shall be constructed of strand roving, transverse mat, and a synthetic surface veil including ultraviolet (UV) light inhibitors.
- C. All pultruded grating and structural shapes shall be flame retardant per ASTM E-84 Class I (flame spread of less than 25).
- D. After fabrication of FRP, all cuts, holes, and abrasion shall be sealed to prevent corrosion.
- E. The FRP materials of the types required shall be the product of one manufacturer, and shall be as manufactured by Seasafe Inc., Lafayette LA, (800-326-8842) or approved equivalent.

### **2.2 FRP LADDERS**

- A. Ladders shall be made from [select either Isophthalic-Polyester or Vinylester] resin.
- B. All ladder components shall be flame retardant per ASTM E-84 Class 1.
- C. Ladder rails shall be 2 x 2 x 1/4 inch square tube. Ladder rungs shall be 1 inch diameter solid round.
- D. Ladders shall be safety yellow.
- E. Ladder rungs shall penetrate the inside wall of ladder rail tube and be countersunk into outside wall of ladder rail tube, providing support for the ladder rung in 4 places. This connection shall be fully bonded with epoxy adhesives and pinned to prevent rung rotation.
- F. Ladder rungs shall have a slip-resistant quartz epoxy grit surface.
- G. Ladder stand-off brackets shall be FRP and shall be installed at a maximum of 6'-0" on center. Ladder base mount brackets are to be FRP. All bolts shall be 316 stainless steel.

### **2.3 ANTI-SLIP SURFACE FOR FRP COMPONENTS**

- A. Where called for in the Specifications, an FRP component shall have an anti-slip top surface of silica grit which shall be molded integral with the glass fiber reinforced substrate.
- B. The silica grit shall be tightly packed with particle to particle contact to a minimum depth of 1/8-inch.

## **PART 3 - EXECUTION**

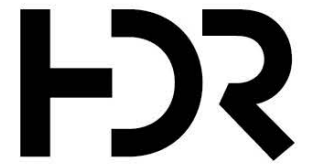
### **3.1 HANDLING AND STORAGE**

- A. Upon receipt of material at job site, the Contractor shall inspect all materials for shipping damage.
- B. Handle all FRP materials with proper care to prevent damage. Use shipping pallets to move material. Do not drag FRP material.
- C. If FRP materials are not to be installed immediately, then the materials shall be stored in a manner to prevent twisting, bending, breaking, or damage of any kind. Keep material covered to prevent unnecessary exposure to UV.

### **3.2 INSTALLATION**

- A. Installing Contractor to coordinate and verify that other construction trades and materials have been installed per the contract drawings, and that they are accurate in location, alignment, elevation, and are plumb and level.
- B. Install FRP materials in accordance with the installation drawings supplied by the FRP supplier.
- C. Install materials accurately in location and elevation, level, and plumb. Field fabricate as necessary for accurate fit.
- D. All field cuts, holes or abrasions must be sealed with sealing resin to prevent corrosion.

**END OF SECTION**



**D I V I S I O N 7**

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Thermal and Moisture Protection

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**SECTION 07900**  
**JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Sealant work.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 09905 - Painting and Protective Coatings.
- C. Work included consists of but is not necessarily limited to:
  - 1. Sealing all joints which will permit penetration of dust, air or moisture, unless sealing work is specifically required under other Specification Sections.
    - a. Work may include the following:
      - 1) Flashing reglets and retainers.
      - 2) Exterior wall joints.
      - 3) Masonry control joints, exterior and interior and between masonry and other materials.
      - 4) Flooring joints.
      - 5) Isolation joints.
      - 6) Joints between paving or sidewalks and building.
      - 7) Concrete construction, control and expansion joints, exterior and interior.
      - 8) Sawed joints in interior concrete slabs.
      - 9) Joints between precast roof units, between precast roof units and walls, and all exterior and interior joints between precast wall panels.
      - 10) Joints at penetrations of walls, floors and decks by piping and other services and equipment.
      - 11) Exterior and interior perimeters of exterior and interior door and window frames, louvers, grilles, etc.
      - 12) Thresholds at exterior doors.
      - 13) Sealing of plumbing fixtures to floor or wall.
      - 14) Sealing around piping, duct or conduit penetrations through roof, floors, interior and exterior walls.
      - 15) Sealing perimeter and penetrations of sound insulated walls.
      - 16) Other joints where calking, sealant, expanding foam sealant or compressible sealant is indicated.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Concrete Institute (ACI):
    - a. 302.1R, Guide for Concrete Floor and Slab Construction.
  - 2. ASTM International (ASTM):
    - a. C834, Standard Specification for Latex Sealants.
    - b. C920, Standard Specification for Elastomeric Joint Sealants.
    - c. C1521, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
  - 3. National Sanitation Foundation International (NSF).
  - 4. Underwriters Laboratories, Inc. (UL).
- B. Qualifications: Sealant applicator shall have minimum five (5) years experience using products specified on projects with similar scope.

- C. Mock-Ups:
  1. Before calking work is started, a mock-up of each type of joint shall be calked where directed by the Engineer.
    - a. The approved mock-ups shall show the workmanship, bond, and color of calking materials as specified or selected for the work and shall be the minimum standard of quality on the entire project.
    - b. Each sample shall cure for a minimum of seven (7) days at which time the sealant manufacturer's authorized factory representative shall perform adhesion tests on each sample joint.
      - 1) Perform adhesion tests per ASTM C1521.
      - 2) If mock-up is not acceptable or if adhesion test fails, provide additional mock-up and adhesion testing as required until acceptable to Engineer.

### **1.3 DEFINITIONS**

- A. "Caulk(ing)," "calk(ing)," and "sealant": Joint sealant work.
- B. Installer or Applicator:
  1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  2. Installer and applicator are synonymous.
- C. Finish sealant: Sealant material per this specification applied over face of compressible sealant or expanding foam sealant specified, to provide a finished, colored sealant joint.
- D. Defect(ive): Failure of watertightness or airtightness.

### **1.4 SUBMITTALS**

- A. Shop Drawings:
  1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
  3. Warranty.
  4. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
  5. Certification of applicator qualification.
- B. Samples:
  1. Cured sample of each color for Engineer's color selection.
  2. Color chart not acceptable.
- C. Miscellaneous Submittals: See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
- D. Test Results:
  1. Provide adhesion test results for each sealant sample including adhesion results compared to adhesion requirements.
  2. Manufacturer's authorized factory representative recommended remedial measures for all failing tests.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver material in manufacturer's original unopened containers with labels intact: Labels shall indicate contents and expiration date on material.

## 1.6 WARRANTY

- A. Material and Labor Warranty:
  - 1. Sealant work free of defects for a period of three (3) years from date of final acceptance.
  - 2. Remove any defective work or materials and replace with new work and materials.
  - 3. Warranty signed jointly by Applicator and sealant manufacturer.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Polyurethane sealants:
    - a. Pecora.
    - b. Sika Chemical Corp.
    - c. Sonneborn - Rexnord.
    - d. Tremco.
  - 2. Silicone sealants:
    - a. General Electric.
    - b. Dow Corning Corp.
    - c. Tremco.
  - 3. Compressible sealant:
    - a. Polytite Manufacturing Corporation.
    - b. Emseal.
    - c. Norton.
    - d. Sandell.
  - 4. Acoustical sealant:
    - a. Pecora.
    - b. Sonneborn.
    - c. Tremco.
  - 5. Polysulfide rubber sealant:
    - a. Pecora.
    - b. Sonneborn.
    - c. Morton Polymer Systems.
  - 6. Expanding foam sealant:
    - a. Macklanburg Duncan.
    - b. Convenience Products.
    - c. FAI International, Inc.
    - d. Power Fasteners.
  - 7. Polyurea joint filler:
    - a. Dayton Superior Specialty Chemical Corporation.
    - b. Euclid Chemical Co.
    - c. L&M Construction Chemicals, Inc.
    - d. Sonneborn.
  - 8. Backer rod, compressible filler, primer, joint cleaners, bond breaker: As recommended by sealant manufacturer.

### 2.2 MATERIALS

- A. Sealants - General:
  - 1. Provide colors matching materials being sealed.
  - 2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
  - 3. Nonsagging sealant for vertical and overhead horizontal joints.
  - 4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
- B. Polyurethane Sealant:

1. One (1) or two (2) components.
  2. Paintable.
  3. Meet ASTM C920 Type S or Type M, Grade NS or P, Class 25, Use NT, T, M, A and O.
    - a. Pecora Dynatrol-IXL, Dynatrol II, Urexpam NR-200, NR-201.
    - b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
    - c. Sonneborn Sonolastic NP-1, NP-II, SL-1 SL-2.
    - d. Tremco Dymonic or Dymeric, Vulkem 116,227,45,245.
- C. Silicone Sealant:
1. One (1) component.
  2. Meet ASTM C920, Type S, Grade NS, Class 25, Use NT, G, A, O.
    - a. General Electric: Silpruf, Silglaze II.
    - b. General Electric: Sanitary 1700 sealant for sealing around plumbing fixtures.
    - c. Dow Corning: 786 for sealing around plumbing fixtures.
    - d. Dow Corning: 790, 795.
    - e. Tremco: Spectrem 1, Spectrem 3, Tremsil 600.
  3. Mildew resistant for sealing around plumbing fixtures.
- D. Compressible Sealant:
1. Size so that width of material is twice joint width.
  2. Foamed polyurethane strip saturated with polymerized polybutylene waterproofing coated on front face with nonreactive release agent that will act as bond breaker for applied sealant.
    - a. Polytite Manufacturing Corp. "Polytite-B."
  3. Fire rated where required.
- E. Joint Cleaner, Primer, Bond Breaker: As recommended by sealant manufacturer.
- F. Sealant Backer Rod and/or Compressible Filler:
1. Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, nonbituminous material recommended by sealant manufacturer to:
    - a. Control joint depth.
    - b. Break bond of sealant at bottom of joint.
    - c. Provide proper shape of sealant bead.
    - d. Serve as expansion joint filler.
- G. Adhesive, Compressible Sealant: As recommended by sealant manufacturer.
- H. Expanding Foam Sealant:
1. One (1) or two (2) component fire rated moisture cured expanding urethane.
  2. Shall not contain formaldehyde.
  3. Density: Minimum 1.5 pcf.
  4. Minimum 70 percent closed cell content.
  5. R-value minimum 5.0/IN.
  6. Flame spread: Less than 25.
  7. Smoke developed: Less than 25.
- I. Acoustical Sealant:
1. One (1) component siliconized acrylic latex sealant.
  2. Non-staining, non-bleeding.
  3. Compatible with paints specified for adjoining materials.
    - a. See Specification Section 09905.
  4. Meet ASTM C834.
    - a. Pecora - AC20+.
    - b. Sonneborn - Sonolac.
    - c. Tremco - Tremflex 834.
- J. Polysulfide Rubber Sealant:
1. One (1) or two (2) component.
  2. Meet ASTM C920.



- a. Pecora Synthacalk GC2+.
  - b. Sonneborn - Sonolastic - two-part polysulfide sealant.
  - c. Morton Polymer Systems - Thiokol Sealants.
- K. Polyurea Joint Filler:
- 1. Two (2) component, semi-rigid material for filling control, sawcut and construction joints in interior concrete floors.
    - a. Dayton Superior Specialty Chemical Corp. "Joint Fill, Joint Seal, Joint Saver II" as required for condition and recommended by manufacturer.
    - b. Euclid Chemical Co. "EUCO QWIK" joint.
    - c. L&M Construction Chemicals, Inc. "Joint Tite 750".
    - d. Sonneborn "TF-100" control joint filler.
  - 2. Comply with ACI 302.1R performance recommendations regarding control and construction joints.
  - 3. Color: Gray.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Before use of any sealant, investigate its compatibility with joint surfaces, fillers and other materials in joint system.
- B. Use only compatible materials.
- C. Where required by manufacturer, prime joint surfaces.
  - 1. Limit application to surfaces to receive calking.
  - 2. Mask off adjacent surfaces.
- D. Provide joint depth for joints receiving polyurea joint filler in accordance with manufacturer's recommendations.

### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions and UL requirements.
- B. Clean all joints.
- C. Make all joints water and airtight.
- D. Make depth of sealing compounds, except expanding foam and polyurea sealant, not more than one-half width of joint, but in no case less than 1/4 IN nor more than 1/2 IN unless recommended otherwise by the manufacturer.
- E. Provide correctly sized backer rod, compressible filler or compressible sealant in all joints to depth recommended by manufacturer:
  - 1. Take care to not puncture backer rod and compressible filler.
  - 2. Provide joint backer rod as recommended by the manufacturer for polyurea joint filler.
- F. Apply bond breaker where required.
- G. Tool sealants using sufficient pressure to fill all voids.
- H. Upon completion, leave calking with smooth, even, neat finish.
- I. Where piping, conduit, ductwork, etc., penetrate wall, seal each side of wall opening.
- J. Install compressible sealant to position at indicated depth.
  - 1. Take care to avoid contamination of sides of joint.
  - 2. Protect side walls of joint (to depth of finish sealant).
  - 3. Install with adhesive faces in contact with joint sides.
  - 4. Install finish sealant where indicated.

- K. Install expanding foam sealant to minimum 4 IN depth or thickness of wall being penetrated if less than 4 IN or as indicated on Drawings.
  - 1. Provide adequate fire rated backing material as required.
  - 2. Hold material back from exposed face of wall as required to provide backer rod and finish sealant.
    - a. Allow expanding foam sealant to completely cure prior to installing backer rod and finish sealant.
  - 3. Material shall be minimum of 70 DegF prior to and during installation.
  - 4. Trim off excess material flush with surface of the wall if not providing finished sealant.

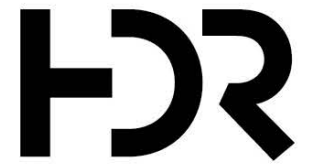
### **3.3 FIELD QUALITY CONTROL**

- A. Adhesion Testing:
  - 1. Perform adhesion tests in accordance with ASTM C1521 per the following criteria:
    - a. Water bearing structures: One (1) test per every 1000 LF of joint sealed.
    - b. Exterior precast concrete wall panels: One (1) test per every 2000 LF of joint sealed.
    - c. Chemical containment areas: One (1) test per every 1000 LF of joint sealed.
    - d. Building expansion joints: One (1) test per every 500 LF of joint sealed.
    - e. All other type of joints except butt glazing joints: One (1) test per every 3000 LF of joint sealed.
    - f. Manufacturer's authorized factory representative shall recommend, in writing, remedial measures for all failing tests.

### **3.4 SCHEDULE**

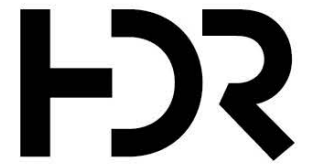
- A. Furnish sealant as indicated for the following areas:
  - 1. Exterior areas: Silicone.
  - 2. Interior wet areas: Silicone.
  - 3. Interior wet, corrosive areas: Polyurethane
  - 4. Interior nonwet, corrosive areas: Silicone.
  - 5. Interior nonwet, noncorrosive areas: Silicone.
  - 6. Compressible sealant: Where indicated.
  - 7. Sealant which will be subject to prolonged contact with or submersion in water (except wastewater and sewage):
    - a. Polysulfide or polyurethane: NSF approved for use in potable water tanks.
  - 8. Penetrations exterior wall above grade:
    - a. For non-corrosive areas, provide expanding urethane foam, with polyurethane finish sealant.
    - b. For corrosive areas, provide expanding urethane foam, bond breaker and polysulfide finish sealant on corrosive side with polyurethane finish sealant on non-corrosive side.
  - 9. Sealant exposed to or having the potential of being exposed to concentrated chlorine gas or chlorine liquid: Polysulfide.
  - 10. Sealant which will be immersed in wastewater or sewage: Polysulfide.
  - 11. Interior concrete floor control joints or sawed joints: Polyurea joint filler.
  - 12. Sealing around plumbing fixtures: Silicone.
  - 13. Plastic laminate casework, plastic laminate countertops and solid surface materials: Silicone.

**END OF SECTION**



**D I V I S I O N 8**

**Doors and Windows (Not Used)**



D I V I S I O N 9

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Finishes

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**SECTION 09905**  
**PAINTING AND PROTECTIVE COATINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. All material painting requirements on the project with the exception of the paint restoration of the filter bays. **See section 09906 for painting requirements for the filter bays paint restoration.**
  2. High performance industrial coatings (HPIC).
  3. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Specification Section.
  4. Minimum surface preparation requirements.
- B. Related Specification Sections include but are not necessarily limited to:
1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  2. Division 01 - General Requirements.
  3. Section 03348 – Concrete Finishing and Repair of Surface Defects.
  4. Section 05120 - Structural Steel.
  5. Section 05500 - Miscellaneous Metals, Fasteners, and Special Finishes.
  6. Section 09906 – Filter Bays Paint Restoration

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. ASTM International (ASTM):
    - a. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
    - b. D4259, Standard Practice for Abrading Concrete.
    - c. D4261, Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
    - d. D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
    - e. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
    - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  2. National Association of Pipe Fabricators (NAPF):
    - a. 500-03, Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings:
      - 1) 500-03-04, Abrasive Blast Cleaning for Ductile Iron Pipe.
      - 2) 500-03-05, Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
  3. National Bureau of Standards (NBS):
    - a. Certified Coating Thickness Calibration Standards.
  4. NSF International (NSF).
  5. The Society for Protective Coatings (SSPC):
    - a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
    - b. SP 1, Solvent Cleaning.
    - c. SP 2, Hand Tool Cleaning.
    - d. SP 3, Power Tool Cleaning.
    - e. SP 16, Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
  6. The Society for Protective Coatings/NACE International (SSPC/NACE):
    - a. SP 5/NACE No. 1, White Metal Blast Cleaning.
    - b. SP 6/NACE No. 3, Commercial Blast Cleaning.
    - c. SP 7/NACE No. 4, Brush-off Blast Cleaning.

- d. SP 10/NACE No. 2, Near-White Blast Cleaning.
  - e. SP 12/NACE No. 5, Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Jetting Prior to Recoating.
  - f. SP 13/NACE No. 6, Surface Preparation of Concrete.
- B. Qualifications:
- 1. Coating manufacturer's authorized representative shall provide written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.
  - 2. Applicators shall have minimum of 10 years experience in application of similar products on similar project.
    - a. Provide references for minimum of three (3) different projects completed in last five (5) years with similar scope of work.
    - b. Include name and address of project, size of project in value (painting) and contact person.
- C. Miscellaneous:
- 1. Furnish paint through one (1) manufacturer unless noted otherwise.
- D. Deviation from specified mil thickness or product type is not allowed without written authorization of Engineer.
- E. Material shall not be thinned unless approved, in writing, by paint manufacturer's authorized representative.

### 1.3 DEFINITIONS

- A. Installer or Applicator:
- 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.
- B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Specification Section where the product is specified.
- C. Corrosive Environment: Immersion in, or not more than 6 IN above, or subject to condensation, spillage or splash of a corrosive material such as water, wastewater, or chemical solution; or exposure to corrosive, caustic or acidic agent, chemicals, chemical fumes, chemical mixture, or solutions with pH range of 5 to 9.
- D. Highly Corrosive Environment: Immersion in, or not more than 6 IN above, or subject to condensation, spillage or splash of a highly corrosive material such as water, wastewater, or chemical solution; or exposure to highly corrosive, caustic or acidic agent, chemicals, chemical fumes, chemical mixture, or solutions with pH range below five (5) or above nine (9).
- E. Exposed Exterior Surface:
- 1. Surface which is exposed to weather but not necessarily exposed to view as well as surface exposed to view.
  - 2. Exterior surfaces are considered corrosive environment.
- F. Immersion Surface:
- 1. Any surface immersed in water or some other liquid.
  - 2. Surface of any pipe, valve, or any other component of the piping system subject to condensation including the pipe support system.
- G. Paint includes the following:
- 1. High performance industrial coatings (HPIC) include: Epoxies, urethanes, vinyl ester, waterborne vinyl acrylic emulsions, acrylates, silicones, alkyds, acrylic emulsions and any other coating listed as a HPIC.

- H. Surface Hidden from View: Surfaces such as those within pipe chases, surfaces between top side of ceilings (including drop-in tile ceilings) and underside of floor or roof structures above, surfaces under overhanging walkways if over five feet above adjacent walking surfaces
- I. AP: Architectural paints.
- J. HPIC: High performance industrial coatings.
- K. SC: Special coatings.

#### **1.4 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Applicator experience qualifications.
    - a. No submittal information will be reviewed until Engineer has received and approved applicator qualifications.
  - 3. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's application instructions.
    - c. Manufacturer's surface preparation instructions.
    - d. If products being used are manufactured by Company other than listed, provide complete individual data sheet comparison of proposed products with specified products including application procedure, coverage rates and verification that product is designed for intended use.
    - e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media.
    - f. Coating manufacturer's recommendation on abrasive blasting.
    - g. Manufacturer's recommendation for universal barrier coat.
    - h. Manufacturer's recommendation for providing temporary or supplemental heat or dehumidification or other environmental control measures.
  - 4. Manufacturer's statement regarding applicator instruction on product use.
  - 5. Certification that High Performance Coating Systems proposed for use have been reviewed and approved by Senior Corrosion Specification Specialist employed by the coating manufacturer.
- B. Samples:
  - 1. Manufacturer's full line of colors for Owner's preliminary color selection.
  - 2. After preliminary color selection by Owner provide two (2) 3 x 5 IN samples of each final color selected.
- C. Informational Submittals:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Approval of application equipment.
  - 3. Applicator's daily records:
    - a. Submit daily records at end of each week in which painting work is performed unless requested otherwise by Engineer's on-site representative.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver in original containers, labeled as follows:
  - 1. Name or type number of material.
  - 2. Manufacturer's name and item stock number.
  - 3. Contents, by volume, of major constituents.
  - 4. Warning labels.
  - 5. VOC content.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, only the following manufacturers are acceptable:
  - 1. High performance industrial coatings:
    - a. Tnemec.
    - b. ICI Devco.
    - c. Carboline Protective Coatings.
    - d. Dampney Company, Inc.
    - e. PPG Industries/Amercoat.

### **2.2 MATERIALS**

- A. For unspecified materials such as thinner, provide manufacturer's recommended products.
- B. Paint Systems - General:
  - 1. P = prime coat.
  - 2. F1, F2 . . . Fn = first finish coat, second finish coat . . . nth finish coat, color as selected by Engineer.
  - 3. If two (2) finish coats of same material are required, Contractor may, at its option and by written approval from paint manufacturer, apply one (1) coat equal to mil thickness of two (2) coats specified.
- C. HPIC products listed in the MATERIALS Article, Paint Systems paragraph are manufactured by Tnemec.
  - 1. Products of other listed manufacturers are acceptable for use providing the product is of the same generic resin, requires comparable surface preparation, has comparable application requirements, meets the same VOC levels or better, provides the same finish and color options and will withstand the atmospheric conditions of the location where it is to be applied.
- D. Paint Systems
  - 1. HPIC SYSTEM #1 - Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Finish Coat(s).
    - a. Prime coat:
      - 1) P1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
    - b. Finish coat(s):
      - 1) Interior:
        - a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
        - b) F2 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
      - 2) Exterior:
        - a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
        - b) F2 = 1 coat, 2.5 mils, Series 1080 Endura-Shield. W.B.(Waterborne Acrylic Polyurethane).
  - 2. HPIC SYSTEM #2 - Zinc-Rich Urethane Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Finish Coat(s).
    - a. Prime coat:
      - 1) P1 = 1 coat, 3.5 mils, Series 90-97 Tneme-Zinc (Zinc-Rich Urethane).
    - b. Finish coat(s):
      - 1) Interior:
        - a) F1 = 1 coat, 6 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
      - 2) Exterior:
        - a) F1 = 1 coat, 6 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
        - b) F2 = 1 coat, 2.5 mils, Series 1080 Endura-Shield W.B.(Waterborne Acrylic Polyurethane).



3. HPIC SYSTEM #3 - Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Top Coat(s).
  - a. Prime coat:
    - 1) P1 = 1 coat, 5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
  - b. Finish coat(s):
    - 1) Interior:
      - a) F1 = 1 coat, 5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
    - 2) Exterior:
      - a) F1 = 1 coat, 2.5 mils, Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
4. HPIC SYSTEM #4 - Zinc-Rich Urethane Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Top Coat(s).
  - a. Prime coat:
    - 1) P1 = 1 coat, 2.5 mils, Series 90-97 Tneme-Zinc (Zinc-Rich Urethane).
  - b. Finish coat(s):
    - 1) Interior:
      - a) F1 = 1 coat, 5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
    - 2) Exterior:
      - a) F1 = 1 coat, 3.0 mils, Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
5. HPIC SYSTEM #5 - Zinc-Rich Urethane Potable Water Approved Primer with Polyamine Epoxy Potable Water Approved Top Coats.
  - a. Prime coat:
    - 1) P1 = 1 coat, 3 mils, Series 91 H<sub>2</sub>O Hydro-Zinc (Zinc-Rich Urethane).
  - b. Finish coat(s):
    - 1) Interior:
      - a) F1 = 1 coat, 25 mils, Series 22 Pota-Pox 100 (Modified Polyamine Epoxy).
6. SYSTEM #6 - Touch-up of galvanized surfaces not requiring a top coat.
  - a. Refer to Specification Section 05505.
7. HPIC SYSTEM #7 - Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy Top Coat.
  - a. Prime coat:
    - 1) P1 = 1 coat, 2.5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
  - b. Finish coat:
    - 1) Interior:
      - a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).

## **PART 3 - EXECUTION**

### **3.1 ITEMS TO BE PAINTED**

- A. General:
  1. Paint the following surfaces in a corrosive or highly corrosive area, whether exposed to view or not:
    - a. Conduit.
    - b. Galvanized metal surfaces.
- B. Exposed Exterior Surfaces including:
  1. Beams, equipment supports, equipment pads, pipe supports.
  2. Piping, valves, and fittings.
  3. Conduit, junction boxes and covers, pull boxes and covers and supports when attached to a surface required to be painted or to a prefinished surface.
  4. Miscellaneous ferrous metal surfaces.
  5. Structural steel.
  6. Steel joists (including bridging).

- C. Surfaces in Areas Not Considered Finished:
  - 1. Paint following surfaces in areas not considered as finished area:
    - a. Piping, valves, and fittings.
    - b. Miscellaneous ferrous metal surfaces.

### **3.2 ITEMS NOT TO BE PAINTED**

- A. General: Do not paint items listed in this Article unless specifically noted in the Contract Documents to be painted.
- B. Items with Approved Factory Finish: These items may require repair of damaged painted areas or painting of welded connections.
- C. Electrical Equipment:
  - 1. Do not field paint electrical equipment except where painting is specifically stated elsewhere in these Contract Documents, or where the equipment is subject to a corrosive environment and is specifically noted to be painted.
- D. Other Items:
  - 1. Stainless steel surfaces except:
    - a. Piping where specifically noted to be painted.
    - b. Banding as required to identify piping.
  - 2. Aluminum surfaces except:
    - a. Where specifically shown in the Contract Documents.
    - b. Where in contact with concrete.
    - c. Where in contact with dissimilar metals.
  - 3. Fiberglass surfaces except:
    - a. Fiberglass piping where specifically noted to be painted.
    - b. Piping supports where specifically noted to be painted.
  - 4. Interior of pipe, ductwork, and conduits.
  - 5. Moving parts of mechanical and electrical units where painting would interfere with the operation of the unit.
  - 6. Code labels and equipment identification and rating plates.
  - 7. Clad aluminum, clad steel, anodized aluminum, PVDF coated aluminum and PVDF coated steel.
  - 8. Contact surfaces of friction-type connections.
  - 9. Galvanized steel items, unless specifically noted to be painted.
  - 10. Bituminous coated ductile iron pipe.

### **3.3 SCHEDULE OF ITEMS TO BE PAINTED AND PAINTING SYSTEMS**

- A. Concrete:
  - 1. None
- B. Steel:
  - 1. Structural:
    - a. Immersion surfaces subject to corrosive or highly corrosive environment requiring NSF approval: SYSTEM #5.
    - b. Non-immersion surfaces subject to corrosive environment: SYSTEM #4.
    - c. All other surfaces (non-corrosive dry environment): SYSTEM #1.
- C. Miscellaneous ferrous metals (non-corrosive dry environment): SYSTEM #1.
  - 1. Not for coating galvanized steel, steel (hollow metal) doors, steel (hollow metal) door and window frames, and products with approved factory finishes.
- D. Ferrous metals subject to corrosive environment: SYSTEM #2.
  - 1. Includes ferrous metal guardrails, piping, stairs, equipment bridges, pumps, and similar items.
  - 2. Does not include items subject to contact with potable water.

- E. Galvanized Metals:
  - 1. Field touch-up where top coat is required: SYSTEM #3, prime and first finish coat only.
    - a. Prime paint only the damaged area.
  - 2. Assembled galvanized steel items: SYSTEM #3.
  - 3. Field touch-up of galvanized surfaces not requiring a finish top coat: SYSTEM #6.
    - a. Paint only damaged areas.
- F. Electrical Conduit:
  - 1. Galvanized: SYSTEM #3.
  - 2. PVC coated: SYSTEM #3.
- G. Pipe, Valves, and Fittings:
  - 1. Bare steel pipe bollards: SYSTEM #2.
  - 2. Steel, cast-iron, and uncoated ductile iron not in immersion service: SYSTEM #2.
  - 3. Stainless steel: SYSTEM #1.
- H. Field painting of fusion bonded epoxy coated piping, valves, couplings, etc.: SYSTEM #7.

### 3.4 PREPARATION

- A. General:
  - 1. Verify that atmosphere in area where painting is to take place is within paint manufacturer's acceptable temperature, humidity and sun exposure limits.
    - a. Provide temporary heating, shade and/or dehumidification as required to bring area within acceptable limits.
      - 1) Provide temporary dehumidification equipment properly sized to maintain humidity levels required by paint manufacturer.
      - 2) Provide clean heat with heat exchanger type equipment sufficient in size to maintain temperature on a 24 HR basis.
        - a) Vent exhaust gases to exterior environment.
        - b) No exhaust gases shall be allowed to vent into the space being painted or any adjacent space.
  - 2. Prepare surfaces to be painted in accordance with coating manufacturer's instructions and this Specification Section unless noted otherwise in this Specification Section.
    - a. Where discrepancy between coating manufacturer's instructions and this Specification Section exists, the more stringent preparation shall be provided unless approved otherwise, in writing, by the Engineer.
  - 3. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of coating to surface.
  - 4. Adhere to manufacturer's recoat time surface preparation requirements.
    - a. Surfaces that have exceeded coating manufacturer's published recoat time and/or have exhibited surface chalking shall be prepared prior to additional coating in accordance with manufacturer's published recommendations.
      - 1) Minimum SSPC SP 7/NACE No. 4 unless otherwise approved by Engineer.
- B. Protection:
  - 1. Protect surrounding surfaces not to be coated.
  - 2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
- C. Prepare and paint before assembly all surfaces which are inaccessible after assembly.
- D. Wood:
  - 1. Sandpaper smooth, then dust.
  - 2. Seal all knots, pitch and resinous sapwood after priming coat has dried.
  - 3. Putty nail holes and minor defects to match wood color.
- E. Ferrous Metal:

1. Prepare ductile iron pipe in accordance with pipe manufacturer's recommendations and NAPF.
    - a. All piping, pumps, valves, fittings and any other component used in any water piping system that requires preparation for painting shall be prepared in accordance with requirements for immersion service.
      - 1) Pipe: NAPF 500-03-04.
      - 2) Fittings: NAPF 500-03-05
    - b. Prepare all areas requiring patch painting in accordance with recommendations of manufacturer and NAPF.
    - c. Remove bituminous coating per piping manufacturer, paint manufacturer and NAPF recommendations.
      - 1) The most stringent recommendations shall apply.
  2. Complete fabrication, welding or burning before beginning surface preparation.
    - a. Chip or grind off flux, spatter, slag or other laminations left from welding.
    - b. Remove mill scale.
    - c. Grind smooth rough welds and other sharp projections.
  3. Solvent clean in accordance with SSPC SP 1 or detergent and low-pressure water clean in accordance with SSPC SP 12/NACE No. 5 all surfaces scheduled to receive additional SSPC surface preparation.
  4. Surfaces subject to corrosive or highly corrosive environment and all surfaces subject to immersion service:
    - a. Near-white blast clean in accordance with SSPC SP 10/NACE No. 2.
  5. All interior and exterior structural steel not included in corrosive, highly corrosive or immersion service surfaces:
    - a. Minimum commercial blast clean in accordance with SSPC SP 6/NACE No. 3.
  6. Surfaces subject to high temperatures.
    - a. Heat in excess of 600 DegF: SSPC SP 10/NACE No. 2.
    - b. Heat in excess of 200 DegF but less than 600 DegF: SSPC SP 6/NACE No. 3.
  7. Surfaces of steel joists and steel trusses:
    - a. Commercial blast clean the major portion of the truss in accordance with SSPC SP 6/NACE No. 3.
    - b. Power tool or hand tool clean tight connection areas and other difficult to access areas in accordance with SSPC SP 2 or SSPC SP 3.
  8. Steel surfaces scheduled to receive SYSTEM #24 or #35:
    - a. White metal blast clean in accordance with SSPC SP 5/NACE No. 1.
    - b. Provide 2-1/2 to 3 mil anchor profile for SYSTEMS #24 and #35.
  9. All fusion bonded epoxy coated surfaces identified to be field painted:
    - a. Remove all traces of gloss finish by sanding or by abrasive brush blasting.
    - b. Clean surface after removing gloss finish to remove sanding or blasting residue.
  10. Restore surface of field welds and adjacent areas to original surface preparation.
  11. Black iron piping: Remove surface varnish by solvent or waterjet and detergent cleaning or brush-off blast cleaning in accordance with SSPC SP 7/NACE No. 4.
- F. Hollow Metal:
1. Clean in accordance with SSPC SP 1 or SSPC SP 12/NACE No. 5 and in accordance with hollow metal manufacturer.
- G. Galvanized Steel and Non-ferrous Metals:
1. Solvent clean in accordance with SSPC SP 1 followed by brush-off blast clean in accordance with SSPC SP 16 to remove zinc oxide and other foreign contaminants.
    - a. Provide uniform 1 mil profile surface.
- H. Abrasive blast clean the following equipment or surfaces regardless of previous finish, if any.
- I. Concrete:
1. Cure for minimum of 28 days.

2. Verify that concrete surfaces have been cleaned and that voids have been patched in accordance with Specification Section 03348.
    - a. Concrete surfaces shall be cleaned in accordance with ASTM D4258.
  3. Mechanically abrade concrete surfaces in accordance with ASTM D4259 as recommended by coating manufacturer.
  4. Abrasive blast concrete surfaces in accordance with SSPC SP 13/NACE No. 6 to provide profile recommended by coatings manufacturer.
  5. Test pH of surface to be painted in accordance with ASTM D4262.
    - a. If surface pH is not within coating manufacturer's required acceptable range, use methods acceptable to coating manufacturer as required to bring pH within acceptable range.
    - b. Retest pH until acceptable results are obtained.
  6. Verify that moisture content of surface to be painted is within coating manufacturer's recommended acceptable limits.
    - a. Test moisture content of surface to be coated in accordance with ASTM D4263.
    - b. After remedial measures have been taken to lower or raise moisture content, retest surface until acceptable results are obtained.
- J. Preparation by Abrasive Blasting:
1. All abrasive-blasted ferrous metal surfaces shall be inspected {and approved in writing by NACE certified coatings inspector} immediately prior to application of paint coatings.
    - a. Inspection shall be performed to determine cleanliness and profile depth of blasted surfaces and to certify that surface has been prepared in accordance with these Specifications.
  2. Schedule the abrasive blasting operation so blasted surfaces will not be wet after blasting and before painting.
  3. Perform additional blasting and cleaning as required to achieve surface preparation required.
    - a. Prior to painting, reblast surfaces allowed to set overnight and surfaces that show rust bloom.
    - b. Surfaces allowed to set overnight or surfaces which show rust bloom prior to painting shall be reinspected and approved by NACE certified coatings inspector prior to paint application.
  4. Profile depth of blasted surface: Not less than 1 mil or greater than 2 mils unless required otherwise by coating manufacturer.
  5. Provide compressed air for blasting that is free of water and oil.
    - a. Provide accessible separators and traps.
  6. Confine blast abrasives to area being blasted.
    - a. Provide shields of polyethylene sheeting or other such barriers to confine blast material.
    - b. Plug pipes, holes, or openings before blasting and keep plugged until blast operation is complete and residue is removed.
  7. Protect nameplates, valve stems, rotating equipment, motors and other items that may be damaged from blasting.
  8. Reblast surfaces not meeting requirements of these Specifications.
  9. Abrasive blasting media may be recovered, cleaned and reused providing Contractor submits, for Engineer's review, a comprehensive recovery plan outlining all procedures and equipment proposed in reclamation process.
  10. Properly dispose of blasting material contaminated with debris from blasting operation not scheduled to be reused.
- K. All Plastic Surfaces and Non-Ferrous Surfaces Except Galvanized Steel:
1. Sand using 80-100 grit sandpaper to scarify surfaces.

### 3.5 APPLICATION

- A. General:
1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.

- a. Application equipment must be inspected and approved in writing by coating manufacturer.
  - b. Hollow metal shall be spray applied only.
  2. Temperature and weather conditions:
    - a. Do not paint surfaces when surface temperature is below 50 DegF unless product has been formulated specifically for low temperature application and application is approved in writing by Engineer and paint manufacturer's authorized representative.
    - b. Avoid painting surfaces exposed to hot sun.
    - c. Do not paint on damp surfaces.
  3. Immediately after surface has been inspected and accepted by NACE certified coatings inspector, apply structural steel and miscellaneous steel and steel joist prime coat in the factory.
    - a. Finish coats shall be applied in the factory.
    - b. Prime coat referred to here is prime coat as indicated in this Specification.
      - 1) Structural steel and miscellaneous steel and steel joist prime coating applied in factory (shop) as part of Fabricator's standard rust inhibiting and protection coating is not acceptable as replacement for specified prime coating.
  4. Provide complete coverage to mil thickness specified.
    - a. Thickness specified is dry mil thickness.
    - b. All paint systems are "to cover."
      - 1) In situations of discrepancy between manufacturer's square footage coverage rates and mil thickness, mil thickness requirements govern.
    - c. When color or undercoats show through, apply additional coats until paint film is of uniform finish and color.
  5. If so directed by Engineer, do not apply consecutive coats until Engineer has had an opportunity to observe and approve previous coats.
  6. Apply materials under adequate illumination.
  7. Evenly spread to provide full, smooth coverage.
  8. Work each application of material into corners, crevices, joints, and other difficult to work areas.
  9. Avoid degradation and contamination of blasted surfaces and avoid intercoat contamination.
    - a. Clean contaminated surfaces before applying next coat.
  10. Smooth out runs or sags immediately, or remove and recoat entire surface.
  11. Allow preceding coats to dry before recoating.
    - a. Recoat within time limits specified by coating manufacturer.
    - b. If recoat time limits have expired re-prepare surface in accordance with coating manufacturer's printed recommendations.
  12. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.
  13. Coat all aluminum in contact with dissimilar materials.
  14. When coating rough surfaces which cannot be backrolled sufficiently, hand brush coating to work into all recesses.
  15. Backroll concrete and masonry surfaces with a roller if paint coatings are spray applied.
- B. Prime Coat Application:
1. Prime all surfaces indicated to be painted.
    - a. Apply prime coat in accordance with coating manufacturer's written instructions and as written in this Specification Section.
  2. Ensure field-applied coatings are compatible with factory-applied coatings.
    - a. Ensure new coatings applied over existing coatings are compatible.
    - b. Employ services of coating manufacturer's qualified technical representative.
      - 1) Certify through material data sheets.
      - 2) Perform test patch.
    - c. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.

- d. At Contractor's option, coatings may be removed, surface re-prepared, and new coating applied using appropriate paint system listed in the MATERIALS Article, Paint Systems paragraph of this Specification Section.
    - 1) All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to Owner.
  - 3. Prime ferrous metals embedded in concrete to minimum of 1 IN below exposed surfaces.
  - 4. Back prime all wood scheduled to be painted, prior to installation.
  - 5. After application of primer to gypsum board surfaces, inspect surface and repair in accordance with the PREPARATION Article of this Specification Section.
    - a. Re-prime repaired surfaces to uniform finish before application of finish coat(s).
  - 6. Apply zinc-rich primers while under continuous agitation.
  - 7. Ensure abrasive blasting operation does not result in embedment of abrasive particles in paint film.
  - 8. Brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over entire surface.
  - 9. Touch up damaged primer coats prior to applying finish coats.
    - a. Restore primed surface equal to surface before damage.
  - 10. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely painted with both prime and finish coats prior to placing in wall.
- C. Finish Coat Application:
- 1. Apply finish coats in accordance with coating manufacturer's written instructions and in accordance with this Specification Section; manufacturer instructions take precedent over these Specifications.
  - 2. Touch up damaged finish coats using same application method and same material specified for finish coat.
    - a. Prepare damaged area in accordance with the PREPARATION Article of this Specification Section.

### 3.6 COLOR CODING

- A. Color and band piping in accordance with the SCHEDULE Article of this Specification Section.
  - 1. Band piping using maximum of three (3) different colors at 20 FT maximum centers.
  - 2. Factory painted piping shall be color banded in the factory per the Schedule in the SCHEDULE Article of this Specification Section.
  - 3. Place bands:
    - a. Along continuous lines.
    - b. At changes in direction.
    - c. At changes of elevation.
    - d. On both sides of an obstruction (e.g., wall, ceiling) that painted item passes through.
  - 4. Band width for individual colors (pipe diameter measured to outside of insulation, if applicable):
    - a. Piping up to 8 IN DIA: 2 IN minimum.
    - b. Piping greater than 8 IN up to 24 IN DIA: 4 IN minimum.
    - c. Piping greater than 24 IN up to 48 IN DIA: 6 IN minimum.
    - d. Piping greater than 48 IN DIA: 8 IN minimum.

### 3.7 FIELD QUALITY CONTROL

- A. Contractor to provide protection for surfaces painted with epoxy coatings to prevent chalking.
  - 1. Surfaces showing chalking will not be accepted regardless of condition of paint film.
- B. Maintain Daily Records:
  - 1. Record the following information during application of each coat of paint applied:
    - a. Date, starting time, end time, and all breaks taken by painters.
    - b. For exterior painting:
      - 1) Sky condition.

- 2) Wind speed and direction.
  - c. Air temperature.
  - d. Relative humidity.
  - e. Moisture content and surface temperature of substrate prior to each coat.
  - f. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind blown dust and debris from contaminating the wet paint film.
  - g. Record environmental conditions, substrate moisture content and surface temperature information not less than once every four (4) hours during application.
    - 1) Record hourly when temperatures are below 50 DegF or above 100 DegF.
  - 2. Record the following information daily for the paint manufacturer's recommended curing period:
    - a. Date and start time of cure period for each item or area.
    - b. For exterior painting:
      - 1) Sky conditions.
      - 2) Wind speed and direction.
    - c. Record environmental conditions not less than once every 12 hours.
      - 1) Record once every four (4) hours when ambient temperature is below 35 DegF.
    - d. Provisions utilized to protect each item or area and to maintain areas within manufacturer's recommended curing parameters.
  - 3. Format for daily record to be computer generated.
- C. Measure wet coating with wet film thickness gages.
  - D. Measure coating dry film thickness in accordance with SSPC PA 2 using Mikrotest gage calibrated against NBS "Certified Coating Thickness Calibration Standards."
    - 1. Engineer may measure coating thickness at any time during project to assure conformance with these Specifications.
  - E. Measure surface temperature of items to be painted with surface temperature gage specifically designed for such.
  - F. Measure substrate humidity with humidity gage specifically designed for such.
  - G. Provide wet paint signs.

### **3.8 CLEANING**

- A. Clean paint spattered surfaces.
  - 1. Use care not to damage finished surfaces.
- B. Upon completion of painting, replace hardware, accessories, plates, fixtures, and similar items.
- C. Remove surplus materials, scaffolding, and debris.

### **3.9 SCHEDULE**

- A. Piping and Pipe Banding Color Schedule (Colors based on Themec):
  - 1. Match existing piping and banding colors.

## **END OF SECTION**



## **SECTION 09906**

### **FILTER BAYS PAINT RESTORATION**

#### **PART 1 - GENERAL**

##### **1.1 WORK INCLUDED**

- A. Provide all labor, materials, equipment and services required to do all painting to related to the filter bays paint restoration portion of the project (excludes all items covered under Section 09905, Painting and Protective Coatings), including preparation, priming and protection of finished surfaces. An extensive and comprehensive painting job will be required and shall include all surfaces designated for repair in the Contract Drawings sheet 01D109.
- B. The intent of these Specifications is to obtain the material and workmanship necessary to produce an adequate and acceptable job, and is intended to describe the requirements for both shop and field painting.
- C. The intent of this Specification Section is to include all items which are to receive painting and have not been included in Section 09905 – Painting and Protective Coatings.

##### **1.2 RELATED WORK**

- A. Division 1 - General Requirements.
- B. 09905 - Painting and Protective Coatings.

##### **1.3 REQUIREMENTS**

- A. It is the intent of this Specification Section that the Contractor shall provide all architectural coatings and all other work obviously required or noted to be painted unless otherwise specified (see also Article 2.01). The omission of minor items in the schedule of work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specifications as stated herein. All interior surfaces and equipment which have been previously painted shall be repainted or recoated following the proper surface preparation.
- B. The Contractor shall review and examine all Divisions and Sections of these Specifications for any additional painting requirements and/or additional surfaces or items to be painted.
- C. Apply specified finish coats of paint to all pre-primed work and complete finishing system for unprimed work required to be painted.
- D. Backprime, with specified interior first coat material all surfaces of finish trim which will be concealed after installation.
- E. Apply specified finish coats of paint to all pre-painted surfaces which are judged by the Engineer as requiring only a finish coat. Otherwise, the complete system (as given in Article 2.1) shall be administered.

##### **1.4 ITEMS NOT REQUIRING FIELD PAINTING**

- A. As noted in Section 09905, Painting and Protective Coatings.

##### **1.5 DEFINITIONS**

- A. The term "paint" as used herein includes enamels, epoxy, paints, sealers, fillers, emulsions, and other coatings.
- B. MDMTPC = Minimum dry mil thickness per coat.

- C. MDFT = Minimum dry film thickness.
- D. SSPC = Society for Protective Coatings.

## 1.6 SUBMITTALS

- A. Manufacturer Name: Contractor shall submit manufacturer's name and brands of coating materials proposed to be used for painting on this project in accordance with Section 01300.
- B. Materials List:
  - 1. Before any materials are delivered to the project site, submit to the Engineer a complete list of all materials proposed to be furnished including quantities, types and descriptions of paint for each part of the project. Material list shall make reference to the specified paint systems and the paint schedule for each paint product proposed to be used. In cases where paint materials other than those described in the Specifications are proposed, a materials list will not be considered as acceptance of such substitute materials; further data will be required as specified herein.
  - 2. Two (2) copies of the full range of colors available in each of the proposed products shall be submitted with the materials list.
- C. Manufacturer's Data:
  - 1. Example of past performance of paints under similar conditions (case histories).
  - 2. Types of paint.
  - 3. Percentage of solids by volume.
  - 4. Recommended usage.
  - 5. Current recommended method of application published by manufacturer, (Data Sheet and Material Safety Data Sheets).
- D. Color Samples:
  - 1. Where standard stock chart colors are not satisfactory, furnish color samples. All tinting and matching shall be the satisfaction of the Owner.
  - 2. Color samples shall be provided to the Engineer's office.
  - 3. Mock-ups:
    - a. Ceiling: One color (white, off-white or beige) will be selected for the ceilings. One section of the ceiling from end-wall to the first structural beam (including the beam) shall be prepared and painted. Prior to continuing work, contractor shall request an inspection of the work for approval. Deficiencies shall be repaired based on a review by the inspecting Engineer and/or Owner. Approved mock-up area shall then serve as the quality standard for all remaining ceiling work to be painted. The paint color shall be selected to match the adjacent ceiling color above filter #2, #4, and #6, as only a portion of this ceiling will be repainted and must best match. All other bays will be painted in their entirety and should be of the same color.
    - b. Walls: Upper +/-24" of existing concrete walls in each Bay require painting within the boundaries set forth in the Contract Drawings. It is the intent that the paint color be selected to match the ceiling paint. Prior to continuing work, contractor shall request an inspection of the test paint section of work for approval. Deficiencies shall be repaired based on a review by the inspecting Engineer and/or Owner. If necessary, color shall be adjusted for matching purposes and wall shall be repainted. Approved mock-up area shall then serve as the quality standard for all remaining walls to be painted.
- E. Experience Records:
  - 1. Shortly after the award of the Contract, the Contractor shall submit experience records of the paint applicator and that of the paint manufacturer.
  - 2. The Contractor shall submit a list of not less than five (5) utility or industrial installations which he has painted during the last five (5) years. This list shall include the names of the owners, the installations painted, responsible officials, architects or engineers of record for the project.

3. Applicators and/or manufacturers whose submissions indicate, in the judgment of the Engineer, that they have not had the experiences required to perform the Work will not be acceptable.

## **1.7 QUALITY ASSURANCE**

- A. Qualification of Painters: All painting shall be done by qualified, skilled, experienced craftsmen. In the acceptance or rejection of completed painting, no allowance will be made for lack of skills on the part of the craftsmen.
- B. Paint Labels: Labels on paint containers shall include the following:
  1. Manufacturer's name.
  2. Generic type of paint.
  3. Manufacturer's stock number.
  4. Color.
  5. Instructions for thinning where applicable.
- C. Field Quality Control: Paint film thickness shall be subject to measurement by the Engineer with elecometer, wet film gauge, low or high voltage meter, and/or applicable measuring instruments acceptable to the Engineer. If dry film thickness is found to be less than specified, or coverage is not uniform, the Contractor shall apply additional paint to correct thickness or appearance at no additional cost to the Owner.
- D. Compatibility:
  1. The Contractor shall be responsible for the compatibility of all paints used in the Work. A compatible paint will be considered a paint which precludes adverse effects related to bonding, drying delamination, scaling, lifting, and bleeding.
  2. In cases where shop-applied primers and coatings on materials and equipment furnished by suppliers are products different from those described in the Specifications, the Contractor shall verify compatibility with the specified field-applied coating system.
  3. Where thinning is necessary, only the products of the manufacturer furnishing the paint, and products for thinning purposes only, will be allowed.
- E. Thickness and Spreading Rates:
  1. per gallon shall be governed by the manufacturer's current data sheets or literature containing recommendations or instructions regarding these values. These recommended dry mil thickness and/or spreading rate values will be considered requirements to be met same as if set out herein these Specifications and Contract Documents and must be included with material list submittals before Engineer grants approval to use any paint materials. Do not exceed manufacturer's recommended coverage rates.
  2. The number of coats to be applied are specified herein and shall govern. Where the total dry film thickness is specified, this thickness shall govern over the MDMTPC.
- F. Technical Services: The Contractor shall provide assurance that a qualified representative of the paint manufacturer makes periodic visits to the project site during painting to verify proper application procedures, quality and progress of work.

## **1.8 PRODUCT DELIVERY, HANDLING AND STORAGE**

- A. Delivery: All materials shall be brought to the project site in the original sealed and labeled containers of the paint manufacturer. All labels shall be legible and intact at time of use.
- B. Manufacturer's Instructions: Paint manufacturer's written instructions for proper surface preparation, mixing, thinning, application and drying shall be furnished with the paint, and strictly followed.
- C. Storage of Materials:
  1. Store only acceptable materials on project site.
  2. Store only in a suitable and designated area restricted to the storage of paint materials and related equipment.

3. Comply with all applicable health and fire regulations regarding the storage of paint materials.
  4. Storage of material shall comply with the manufacturer's specifications; however, storage shall be at a minimum temperature of 50 degrees F.
- D. Protection of Materials:
1. Take all necessary precautions to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.
  2. Painting wastes shall be properly deposited in containers made for this purpose. Do not use plumbing fixtures for disposing paints wastes.
  3. Take all necessary precautions to protect paint materials before, during and after application and to protect the finished work.
- E. Replacement: In the event of damage to paint materials, immediately make all replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
- F. Product delivery, handling and storage shall be in accordance with Part 1 of this Specification.

## 1.9 JOB CONDITIONS

- A. Site Conditions:
1. The contractor should prepare its bid assuming that the majority of the ceilings and walls to be repainted will require sandblasting or scraping to expose the existing concrete surface to ensure proper bonding between the paint and concrete surface.
- B. Environmental Requirements:
1. Comply with manufacturer's recommendations as to environmental conditions under which painting systems can be applied.
  2. Do not apply finish in areas where dust and/or mist is being generated.
- C. Climatic Conditions: Paint shall not be applied if:
1. The ambient temperature or temperature of the surface to be painted is below 50 degrees F or below the temperature recommended by the paint manufacturer.
  2. The relative humidity is above 85 percent.
  3. The relative humidity is such that the paint will not dry properly in accordance with the manufacturer's instructions.
- D. Protection: Complete filter bay protection and decking shall be provided by the General Contractor. Painting Contractor shall verify all such protection measures with the G.C. prior to bidding work of the Project to ensure that painting operations will be sustainable with protective measures in-place. All painting operations shall be coordinated with the G.C. and his protection measures such that all painting work may be accomplished without delay or incident. Painting Contractor shall provide additional protective measures, over and above those furnished by the General Contractor, if/as necessary to fully accomplish painting work.
1. Protect with drop cloths, masking or other acceptable means all surfaces which could be damaged in function or appearance by paint, including surfaces not being painted concurrently and surfaces not to be painted.
  2. Hardware, accessories, fixtures and similar items shall be removed and replaced after completion of painting.
  3. Spray painting will not be permitted when it will cause damage to adjacent or otherwise located surfaces.
  4. All paint splatters on glass shall be wiped off immediately and all prefinished window frames shall be masked and protected.

## 1.10 ACCEPTABLE MANUFACTURERS

- A. The paints listed are products of Carboline (where indicated) and are specified as a "standard of quality" only. Other approved manufacturers include: Tnemec. Similar architectural paints and painting systems may be substituted as appropriate, subject to approval by the Owner and Engineer and to the provisions contained herein.

**1.11 PAINT ADHESION TESTING ON CEILING PANELS**

A. The Painting Contractor in conjunction with the Coatings Manufacturer who is chosen for this project must test the ceiling panels for adhesion after the substrate has been power wash cleaned and abrasive blasted and prepared per SSPC-SP 13/NACE No. 6 – Surface Preparation of Concrete (See Section 3.3) to create a suitable anchor pattern (or surface profile) which will ensure adhesion. The product standard for priming the concrete surfaces is Carboline Sanitile 500 applied at 5.0 - 20.0 mils dry film thickness depending on degree of pinholing, honeycombing, etc. following the preparation of the surface. Once fully cured, perform ASTM 3359, Test Method B to evaluate adhesion to the substrate. If the adhesion test fails, the ceiling must be reevaluated by the Coatings Manufacturer and Painting Contractor to determine the cause of the failed test. The test surface shall be reprepared and solvent cleaned as needed to achieve an acceptable substrate to reapply the coating and retest. Repeat process until passing tests are achieved.

1. Notify Owner and Engineer at least 3 days ahead of testing as Owner/Engineer may plan to witness the testing

**PART 2 - PRODUCTS**

**2.1 PAINT SYSTEMS**

- A. General:
  1. All paints of a specific system shall be by one (1) manufacturer.
  2. "Lift" tests may be requested by the Engineer on various surfaces to be painted to assure bonding compatibility.
  3. Paints containing lead, or other "dangerous" materials, that surpass federal maximum levels shall not be allowed. Oil shall be pure boiled linseed oil.
- B. Paint Systems: See Paint Schedule Table below.
- C. Paint Schedule:

Sys. No.	Description	Primer Coat Material	Intermediate Coat Material	Finish Coat Material
1	Interior "Prepared" Concrete or CMU Surfaces	Carboline: Sanitile 500 at 5.0-20.0 mils dry film thickness resulting in pinhole free surface	Carboline: Carboguard 60 at 4.0-6.0 mils dry film thickness	Carboline: Carboguard 60 at 4.0-6.0 mils dry film thickness

**2.2 COLORS**

- A. The manufacturer shall be able to furnish all paints for exposed surfaces in a wide range of colors and lighter and darker shades of these colors from which the Owner may select the colors required on the various surfaces.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

- A. Examine surfaces scheduled to receive paint and/or coating finishes for conditions that will adversely affect application, permanence or quality of work and which cannot be put into an acceptable condition through surface preparation.

- B. Do not proceed with surface preparation or painting application until conditions are suitable.
- C. If surfaces are not thoroughly dry or if they cannot be put in proper condition to receive paint by customary cleaning methods, the painting applicators shall notify the Contractor in writing, requesting necessary corrections.
- D. Review the specified or approved painting systems and bring any questions or doubts as to the proper performance in writing to the Engineer at least 15 calendar days prior to commencing work. Otherwise, the Contractor shall assume the responsibility for providing the desired results.

### **3.2 ACCEPTANCE OF SURFACES**

- A. The commencement of painting work in any area or space will be construed as acceptance of the surface as being satisfactory.

### **3.3 SURFACE PREPARATION**

- A. Concrete (Cementitious) Ceiling and Wall Surfaces:
  1. Prior to Blasting in accordance to SSPC-SP 13/NACE No. 6 - Surface Preparation of Concrete, Contractor shall pressure wash the ceilings using no less than 3,000 psi (pressure washer) with a solution of Carboline's Surface Cleaner #3, or approved equal. Follow mixing directions on the product data sheet. Allow to dry completely before removing by means of abrasive blasting.
  2. All cementitious surfaces shall be thoroughly prepared by mechanical, chemical, and/or thermal methods prior to the application of bonded protective coating or lining systems as set forth in SSPC-SP 13/NACE No. 6 – Surface Preparation of Concrete. No painting/coating shall be done until surface is inspected by the Engineer or his designates. Contractor shall prepare bid with the understanding that all existing paint coatings as indicated on the Contract Drawings shall be completely removed in their entirety down to original concrete.
  3. Surfaces shall be primed and/or treated, as specified, as soon after completion of surface preparation as practical, but in any event before any visible or detrimental corrosion or contamination can occur. A prepared surface, which becomes corroded or contaminated, shall be re-prepared before treating and/or priming.
  4. All preparation procedures shall be performed in such a manner so as to prevent the pollution or migration of deleterious materials from entering and/or contaminating the water filter reservoirs.
  5. All painting and coating applications shall be applied only when temperature, atmospheric, and other notable site conditions comply with the coating manufacturer's recommendations for the application of the product (i.e. no paint shall be applied when temperatures are below or anticipated to fall below 50 degrees Fahrenheit within 24 hours of application, etc.).

### **3.4 THINNING**

- A. Thinning shall be done strictly in accordance with the paint manufacturer's instructions and only upon notifications to the Engineer. When thinning is acceptable, coats of paint shall be applied as needed to build up to the specified dry film thickness.

### **3.5 APPLICATION**

- A. On concrete, the application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded.
- B. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint.
- C. Evenly brush out each finish coat and permit to dry per manufacturer's recommendation before applying any subsequent coats.
- D. All paints and coatings shall be maintained at minimum manufacturer's application temperature before applying.

- E. Finish surfaces shall not show brush marks or other irregularities. Undercoats shall be thoroughly and uniformly sanded to remove defects and provide a smooth even surface.
- F. Painting shall be continuous and shall be accomplished in an orderly manner so as to facilitate inspection. Materials subject to weathering or moisture intrusion shall be prime coated as quickly as possible. Surfaces of exposed members that will be inaccessible after erection shall be cleaned and painted before erection.
- G. All surfaces to be painted as well as the atmosphere in which painting is to be done shall be maintained at the conditions recommended by manufacturer by heating and ventilating, if necessary, until each coat of paint has hardened. Any defective paint shall be removed and the surface repainted.
- H. Perform all required back-priming work before items are installed.

### **3.6 REINSTALLATION OF REMOVED ITEMS**

- A. Following completion of painting in each space, promptly reinstall all items removed for painting, using only workmen skilled in the particular trade.

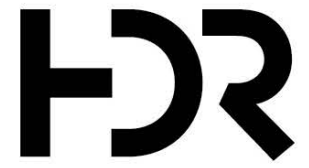
### **3.7 CLEANING**

- A. During the progress of Work, do not allow the accumulation of empty containers or other excess items except in areas specifically reserved for that purpose.
- B. Take all precautions to prevent accidental spillage of paint materials. In the event of spilling, immediately remove all spilled materials and the waste and other equipment used to clean-up the spill, and wash surfaces to their original undamaged condition.
- C. Touch-up and restore finish where damaged.
- D. Remove all trash and accumulated materials of a painting nature from premises at the completion of the Work.
- E. Paint spots, oil or stains upon adjacent surfaces shall be removed. Any damage to Work of other trades or equipment caused from painting shall be made good at no expense to the Owner.
- F. Do not mar surface finish of items being cleaned.
- G. Leave entire job clean (including paint storage space) and acceptable to the Engineer.

### **3.8 FINAL INSPECTION**

- A. Protect all painted surfaces against damage until the date of final acceptance of the Work.
- B. The Engineer will conduct a final inspection of all painting work and the Contractor will be required to repaint or retouch any areas or surfaces found deficient in complying with these Specifications.

**END OF SECTION**



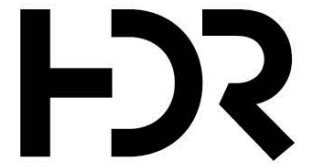
**D I V I S I O N 1 0**

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Specialties (Not Used)

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D I V I S I O N 1 1

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Equipment

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**SECTION 11121**  
**SLUDGE COLLECTION: CIRCULAR PLOW-TYPE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Design, fabrication, installation and testing requirements for:
    - a. Clarifiers (sedimentation basins at water treatment plant).
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 01 - General Requirements.
  - 3. Section 09905 - Painting and Protective Coatings.
  - 4. Division 16 - Electrical.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Aluminum Association (AA):
    - a. ASD 1, Aluminum Standards and Data.
  - 2. American Bearing Manufacturers Association (ABMA):
    - a. 9, Load Ratings and Fatigue Life for Ball Bearings.
  - 3. American Gear Manufacturers Association (AGMA):
    - a. 2001-D, Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.
    - b. 6034-B, Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors.
  - 4. American Iron and Steel Institute (AISI).
  - 5. ASTM International (ASTM):
    - a. A36, Standard Specification for Carbon Structural Steel.
    - b. A48, Standard Specification for Gray Iron Castings.
    - c. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - d. A276, Standard Specification for Stainless Steel Bars and Shapes.
    - e. A536, Standard Specification for Ductile Iron Castings.
    - f. E18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials.
  - 6. American Welding Society (AWS):
    - a. D1.1, Structural Welding Code - Steel.
  - 7. American Water Works Association/American National Standards Institute (AWWA/ANSI):
    - a. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
  - 8. NACE International (NACE).
  - 9. National Electrical Manufacturers Association (NEMA):
    - a. MG 1, Motors and Generators.
  - 10. Occupational Safety and Health Administration (OSHA).
  - 11. Society of Automotive Engineers (SAE):
    - a. AMS 6440M, Steel, Bars, Forgings, and Tubing 1.45Cr (0.98 1.10C) (SAE 52100) For Bearing Applications.
- B. Qualifications:
  - 1. Comply with AWS D1.1 procedures and practices.
  - 2. Manufacturer experience:
    - a. Minimum five (5) similar clarifier mechanism installations with diameters greater than or equal to 90 percent of the diameter of this specified clarifier.

- b. Supplied similar equipment for the past 10 years.
- c. The mechanism shall be a standard production product of the manufacturer.
- 3. NACE inspector shall be a certified Level 3 inspector and have a minimum of five (5) years experience performing inspections indicated.
  - a. NACE inspector shall also be a certified coatings inspector and shall have a minimum of five (5) years experience performing coating inspections.
- C. Independent Design Evaluation of Drive:
  - 1. Clarifier manufacturer to submit the following information for the proposed drive unit to an independent AGMA member engineer for design evaluation:
    - a. Complete drive assembly fabrication drawings.
    - b. Drive component drawings and/or brochures for all drive components.
    - c. Manufacturer and model of all drive components.
    - d. Gear and pinion interval specifications, including all heat-treating procedures.
    - e. AGMA calculations for drive components.
    - f. Additional information needed to completely evaluate proposed drive assembly.

### 1.3 SYSTEM DESCRIPTION

- A. Provide single source coordination responsibility through the manufacturer for the complete sludge collection system.
- B. Clarification equipment shall be the center drive type supported on the existing stationary concrete center column.
- C. Major Components of the clarification equipment shall include, but not be limited to:
  - 1. Center drive mechanism, gear motor and overload alarm.
  - 2. Control panel and electrical controls.
  - 3. Center drive cage.
  - 4. Truss rake arms with segmented rake blades and squeegees.
  - 5. Fasteners.
  - 6. And all other components necessary for a complete operating system
- D. The existing center concrete column support will be reused along with the existing access walkways and platforms.

### 1.4 SUBMITTALS

- A. Submit the following with the Proposal:
  - 1. Proposal data sheets.
  - 2. Clarifier mechanism drawings using existing column support and sludge withdrawal.
  - 3. Sufficient data to verify compliance with specifications and to illustrate construction or assembly of the product.
- B. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer, model and type.
    - c. Complete erection, installation, operation and maintenance information provided by the manufacturer.
    - d. Complete construction details, materials of construction, drawings of mechanisms, gears, gear reducers, electrical wiring diagrams, control wiring diagrams, and other pertinent information.
    - e. Catalog cutsheets for purchased subcomponents.
    - f. Submit evidence of compliance with Article 2.7 requirements, including:
      - 1) Reference standards.
      - 2) Independent evaluation of drive.

- 3) Structural design requirements.
  - g. Main drive speeds.
  - h. Size, make, and type of electric motors and drive systems.
  - i. AGMA rated alarm, stall, and ultimate torque capabilities.
  - j. Details of any revision necessary to adapt the piping, structural, electrical and instrumentation design to the equipment proposed.
  - k. Manufacturer, model and certification of compliance to ABMA 9 bearing life.
  - l. NACE inspector qualifications.
  - m. Certification report from AGMA engineer confirming that equipment design meets referenced AGMA standards.
  - n. For-information-only calculations as follows:
    - 1) Complete sludge transport calculations substantiating the spiral rake blade design, rake tip speed, with existing floor slope.
    - 2) Complete process calculations substantiating the size of the center column and ports, and the energy dissipating inlet (EDI) and outlet ports, and the flocculating center well.
  - o. Calculations and details must bear the stamp of a professional engineer.
- C. Operation and Maintenance Manuals:
- 1. See Specification Section 01300 for requirements for:
    - a. The mechanics and administration of the submittal process.
  - 2. See Specification Section 01730 for requirements for:
    - a. The content of Operation and Maintenance Manuals.
  - 3. Certified as-built drawings (general arrangement and general arrangement details).
  - 4. Erection drawings.
  - 5. Complete bill of materials for the equipment, including the weights of all structural steel components.
  - 6. Installation and maintenance instructions for the specific equipment including:
    - a. Erection sequence.
    - b. Maintenance and trouble-shooting check points.
    - c. Complete lubrication procedures with recommended grades of lubricants.
  - 7. Cut sheets for all equipment items purchased from sub-vendors.
  - 8. Clarifier manufacturer's recommended spare parts, specifically denoting:
    - a. Wear items.
    - b. Long-delivery items.
    - c. All items convenient for stock as optional replacement items.
- D. Informational Submittals:
- 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Manufacturer's certification regarding installation and start-up.
  - 3. Submit copy of field torque test results to Engineer.
  - 4. Submit copy of report verifying completion of start-up and related field services.
    - a. NACE certification of surface preparation and paint application at factory.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01600 and 01620.
- B. Factory Assembly:
  - 1. Assemble each mechanism in factory to ensure proper fit of parts.
  - 2. Mark parts with erection marks.
  - 3. Disassemble mechanism into largest sections allowed by carrier regulations for shipment.

## 1.6 SITE CONDITIONS

- A. Clarifiers: Equipment suitable for installation in settling basins.
- B. Water Temperature: 32 to 100 DegF.

- C. Ambient Temperature: -20 to 120 DegF.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Acceptable manufacturers for this item are 1) D.B.S Manufacturing, Inc. Atlanta, GA in conjunction with ClearStream Environmental, Inc. Sandy, UT, or 2) ENVIREX-EVOQUA Water Technologies, Alpharetta, GA. or approved equal.
- B. This specification is designed on the provision of D.B.S Manufacturing, Inc./ClearStream Environmental, Inc. Any modification or adjustment to the electrical, structural, operation, and any other portion of the design required to support the change in equipment manufacturer shall be completed at the Contractor's expense and must be approved by the Engineer and Owner. All information necessary for this shall be supplied to the Engineer within ten (10) calendar days following the bid opening for review.

### **2.2 MATERIALS**

- A. General:
  - 1. Structural members and connections:
    - a. Unit stresses not to exceed 130 percent of AISI allowable stresses when subjected to cutout torque and/or field test torque, whichever is higher.
  - 2. Compression members:
    - a. Slenderness ratio not to exceed 120 for any axis parallel to bending action.
  - 3. Tension members:
    - a. Slenderness ratio not to exceed 240 for any axis parallel to bending action
- B. Bridge: Steel, ASTM A36, Grade B.
- C. Center Column: Steel, ASTM A36.
- D. Plate: Steel, ASTM A36.
- E. Structural Shapes: Steel, ASTM A36.
- F. Tube: Steel, ASTM A36.
- G. Main Spur Gear:
  - 1. Ductile iron: ASTM A536, 80-55-06 or 80-60-03.
  - 2. Cast iron: ASTM A48, Class 60 or 50A.
- H. Main Bearings: SAE AMS 6440M, Rockwell C64, ASTM E18.
- I. Worm, Worm Shaft:
  - 1. Ductile iron: ASTM A536, 80-55-06.
- J. Pinion and Pinion Shaft:
  - 1. Ductile iron: ASTM A536, 80-55-06.
- K. Gear Housing:
  - 1. Gray iron, ASTM A48.
  - 2. Forged alloy hardened steel, ASTM A36.
- L. Shear Pins: 2017-T4, AA ASD 1, aluminum screw machine stock.
- M. Shear Pin Holes: Hardened steel, Rockwell "C" 62-64, ASTM E18.
- N. Turntable Base:
  - 1. Gray iron, ASTM A48.
  - 2. Forged alloy hardened steel, ASTM A36.
- O. Liner Strips: Steel, Rockwell "C" 38-42, ASTM E18.
- P. Plow Squeegees: 316 stainless steel.

- Q. Drive Dust Shield: Steel, ASTM A36.
- R. Drive Seal: Neoprene.
- S. Lip Seals: Neoprene.
- T. Submerged Fastening Hardware including Anchor Bolts: ASTM A276, 316 stainless steel.
- U. Pipe: Ductile iron, Grade 60-42-10, Class 53 or steel, ASTM A53.
- V. Pipe Flanges: AWWA/ANSI C110/A21.10 with neoprene gaskets.
- W. Hardware and fasteners below water level shall be 316 stainless steel. Fasteners and hardware above water level shall be 304 stainless steel or 316 stainless steel.

## 2.3 EQUIPMENT

- A. Clarifier Performance Requirements:
  - 1. Tank dimensions: 89 FT 5 IN DIA.
  - 2. Sidewater depth: 15FT 0 IN.
  - 3. Sidewall depth: 16 FT 0 IN.
  - 4. Floor Slope: 2.1%
  - 5. Rake arm tip speed (feet/minute): 8 – 10
  - 6. Minimum Torque Requirements (ft-lbs)
    - i. Continuous Operating: 35,000
    - ii. Maximum Overload: 70,000
    - iii. Momentary Peak Load: 195,000
    - iv. Mechanism Design Strength: 70,000
  - 7. Maximum or peak influent flow: 11MGD (rated capacity)
  - 8. Average influent flow: 6.0 MGD (current average daily)
  - 9. Drive pinion: Single.
- B. Drive Design Requirements:
  - 1. Mechanism design shall be such that there are no chains, sprockets or bearings below or in contact with the liquid.
  - 2. Gearing shall be designed and rated per the current American Gear manufactures Association Standards.
  - 3. Drive shall have a minimum operating life of 20 years at the continuous torque and speed rating listed above.
  - 4. The drive shall include a condensate control unit (CCU).
  - 5. **Shall be designed to convey heavy silt and sludge in the event the on site storage reservoirs need to be bypassed indefinitely and all primary settling needs to be performed in the clarifiers.**
- C. Structural Design:
  - 1. Maximum ratio of unbraced length to least radius of gyration (slenderness ratio):
    - a. Compression members: 120.
    - b. Tension members: 240 (for angle about Z-Z axis).
  - 2. Maximum unit stress: 1.333 times AISI allowable stresses at all structural members when subject to twice the drive motor running torque.

## 2.4 COMPONENTS

- A. Overload Monitoring and Protection System:
  - 1. Furnish an electrical-mechanical overload control system for each clarifier drive mechanism, including:
    - a. Factory calibrated torque switches rated 5 amps at 120 Vac minimum.
    - b. Field adjustable over the full torque range of the unit.
    - c. Alarm switch set at 100 percent of AGMA rated drive torque capacity in case of an impending overload.
    - d. Second alarm switch set at 120 percent of AGMA rated drive torque capacity to shut down drive motor.

- e. Amperage and current sensing devices shall not be acceptable for the overload sensing system.
  - 2. Provide time delay relays with timers per Division 16 to prevent alarms on start-up and shutdown.
  - 3. Mechanism loading indicator:
    - a. Separate device, suitable for outdoor mounting.
    - b. Mechanism loading indicated on a 0-130 percent graduated scale at all times during operation.
    - c. Oriented so that torque may be read from access bridge side.
  - 4. Provide all necessary current transformers, relays and other appurtenances for a complete system.
- B. Shear Pins:
- 1. Shear pin device: Set for 125 percent of AGMA rated torque.
  - 2. Provide straight, non-tapered shear pins with bushings.

## 2.5 ACCESSORIES

- 1. None

## 2.6 FABRICATION

- A. General:
- 1. Welds on submerged or partially-submerged components shall be continuous.
  - 2. Dull sharp corners of cut or sheared edges by at least two (2) passes of a power grinder.
  - 3. All fasteners shall be as noted in 2.2W.
- B. Center Pier:
- 1. Use existing concrete pier, manufacturer to verify dimensions and conform design to fit.
  - 2. Provide a drive mechanism mounting plate set plumb with the centerline of the center pier.
- C. Center Drive Cage:
- 1. Provide an all-welded steel box truss construction.
  - 2. Drive cage shall transmit and/or carry all torques (including stall torque) without over stressing members.
    - a. Do not transmit any torque to the access bridge.
  - 3. Design drive cage to encompass center column.
    - a. Design cage to withstand 200 percent of design torque.
  - 4. Design adjustable connection between drive unit and drive cage to provide for proper alignment and allowance for structural tolerance.
- D. Rotating Sludge Scraper Assemblies:
- 1. Provide two (2) rotating spiral scraper arms supported from drive cage.
  - 2. Fabricate collector assemblies from structural steel shapes using triangular or box truss construction.
  - 3. Reinforce top and bottom for proper distribution of loads to supports.
  - 4. Design truss arms to avoid use of tie rods.
  - 5. Attach truss arms to drive cage.
    - a. Provide adjustment arrangement to allow setting truss arms symmetrically about the clarifier floor and the center drive cage.
    - b. After the truss arms are adjusted and certified by manufacturer's representative, weld truss arms to center drive cage.
  - 6. Provide stainless steel scraper blade squeegees under truss arms to move settled sludge to central sludge hopper.
    - a. Provide smooth, unobstructed face of spiral blade to efficiently convey sludge to hopper.
    - b. Do not thread spiral blade through or within the truss.
    - c. Install blade-supporting system on backside of blade.
  - 7. Arrange scraper blades to collect sludge for full width of basin and transport sludge to collection hopper at center of basin.

8. Provide blades that are vertically-adjustable and conforming to tank bottom.
  9. Fabricate truss arms parallel to the top alignment of spiral scraper blade.
  10. Calculate the size of blade based on the quantity of sludge to convey.
    - a. Blade depth to be depth of sludge plus 1 inch.
- E. Drive Mechanism:
1. The drive mechanism shall consist of an electric motor, a condensate control unit (CCU), a primary reduction unit, an intermediate reduction unit, and an enclosed final reduction unit consisting of pinion and an integral gear/bearing. All components are directly coupled, eliminating chains and V-belts. The drive unit output torque shall be limited by a torque overload protection device.
  2. The primary reduction unit shall be a hydrostatic unit driving the intermediate gear reducer.
    - a. The primary reduction unit shall consist of a hydraulic gear pump and a hydraulic motor.
    - b. The primary reduction unit shall have an integral hydraulic manifold that incorporates a hydraulic pressure relief valve to give protection against overload, a flow control valve, a valve cavity for a bi-directional option, two 1/4 NPT instrumentation ports, and a port for hydraulic filter.
    - c. All hydraulic components and hydraulic lines shall be enclosed in a steel housing of sufficient size to contain the minimum 7 gallons of hydraulic oil. The housing shall serve as the reservoir for the hydraulic oil.
    - d. A disposable spin-on type hydraulic filter shall be provided to filter the hydraulic oil.
    - e. The hydraulic pump drive shaft must be vertical to permit vertical mounting of electric motor.
  3. Final Reduction Unit:
    - a. The final reduction housing shall be manufactured from A36 steel plate. All welds shall conform to applicable specifications of the ASME. After welding, all mounting and mating surfaces shall be machined to insure proper fit and alignment of the drive pinion and mating gear. The base plate on which the gear and bearing is mounted shall be flat within 0.005". The steel plate to which the intermediate pinion drive gearbox is mounted shall be a minimum of 1.25" thick.
    - b. The final reduction unit gear shall be machined to AGMA grade 6 or higher. Gear teeth shall have a core hardness of 250 to 300 BHN, and be induction hardened to 55 Rc. The main gear set shall be rated per AGMA Standard 2001-C95 for 20 years at a continuous torque load of at least 35,000 ft. lbs. Gear pitch diameter shall be a minimum of 42".
    - c. The final reduction unit pinion shall be made of heat-treated alloy steel and shall be mounted on the output shaft of the intermediate reduction gearbox. The gear teeth shall be induction hardened to 55 to 60 Rc.
    - d. The bearing shall have a seal to prevent contamination of the bearing raceway. The bearing shall have a  $L_{10}$  life in excess of 100 years
  4. Electric Motor: The drive motor shall be Mill & Chemical Duty, TEFC, 1.15 Service Factor, Class F insulation. Motor shall be name plate rated for operation on 208 V, 3-PH, 60 Hz current. Motor shall be a minimum  $\frac{3}{4}$  HP.
  5. CCU: Condensate Control Unit shall consist of a 110V fan, and heater, to constantly circulate warm air through the main housing to prevent the formation of condensate within the main bearing and housing.
  6. Torque indication and overload protection:
    - a. The torque overload protection device shall be attached to the primary reduction unit, and activated by the torque reaction of the primary reduction unit.
    - b. The torque load of the drive unit shall be indicated on a stainless steel 6 inch diameter torque gauge in ft-lbs
    - c. The overload protection device shall have two switches, which may independently energize an alarm circuit and motor cutoff circuit when the load o the mechanism reaches the customer specified torque settings.
    - d. The switches shall be enclosed in a NEMA 4X housing.



- e. In addition to alarm and cutoff, the drive unit is also protected by a shear pin.
- F. Access Platforms:
  - 1. Utilize existing platforms.
- G. Walkways:
  - 1. Utilize existing walkways.
- H. Anchorage:
  - 1. Provide all fasteners and anchor bolts as noted in 2.2W complete with nuts and washers for equipment installation.
  - 2. Bolts shall be 1 IN DIA minimum.
- I. Fasteners:
  - 1. All fasteners shall be as noted in 2.2W.
  - 2. Bolts shall be 1/2 IN DIA minimum.
- J. Shop or Factory Finishing:
  - 1. Surface preparation and shop painting is required for all ferrous metals, equipment and accessories and shall be as specified under Section 09905.
  - 2. Apply a heavy application of a rust-resistant coating to gears, bearing surfaces, and other unpainted surfaces.
    - a. Maintain coating during storage and until the equipment is placed into operation.
  - 3. All aluminum in contact with dissimilar materials shall be coated with Koppers Hi-guard, two (2) coats, 2.0-3.0 dry mils per coat.
  - 4. Fabricated steel shall receive surface preparation in accordance with SSPC-SP10 Near White Blast requirements, then receive prime and finish coats for an NSF-61 approved hi build epoxy.

## 2.7 SOURCE QUALITY CONTROL

- A. Provide evidence of compliance with PART 1 requirements for the following:
  - 1. Referenced standards.
  - 2. Independent design evaluation of drive.
- B. Provide evidence of compliance with PART 2 requirements, signed by a Registered Professional Civil or Structural Engineer, for the following:
  - 1. Structural members and connections are designed so that unit stresses do not exceed 130 percent of AISI allowable stresses.
  - 2. Compression and tension member slenderness ratios do not exceed 120 and 240 respectively.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install clarifier equipment according to manufacturer's written recommendations.
  - 1. Manufacturer's service technician shall observe the equipment installation.
  - 2. Manufacturer's representative shall certify that mechanism has been installed in accordance with manufacturer's recommendations.

### 3.2 FIELD QUALITY CONTROL

- A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
  - 1. Inspect equipment covered by these Specifications.
  - 2. Supervise adjustments and installation checks.
  - 3. Provide test equipment, tools, and instruments necessary to accomplish equipment testing.
  - 4. Conduct initial startup of equipment, perform operational checks, and supervise acceptance testing.

5. Provide through Contractor a written statement that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.
  6. Instruct Owner's personnel as specified in Section 01450 at jobsite on operation and maintenance of furnished equipment.
  7. Provide the following:
    - a. For equipment startup and testing: 8 HRS (1 Day) minimum on site.
- B. Torque Test:
1. Load test the entire collector mechanism by anchoring collector arms individually, one (1) at a time.
    - a. In successive tests, demonstrate the sludge collection mechanism's (including drive unit, cage, gears and structures) capability to withstand not less than 130 percent of the specified rated running torque.
  2. Field torque test the clarifier mechanism under the supervision of the equipment manufacturer's representative before the mechanisms are approved and placed into operation.
  3. The torque test shall consist of securing the rake arms by cables to anchor bolts installed by the contractor in the tank floor at locations recommended by the manufacturer and the Engineer.
    - a. Apply a torque load to the scraper arm by means of a ratchet lever and cylinder connected to the cable assembly.
  4. Measure the magnitude of the applied load by calculating the torque from the distance of the line of action of each cable to the center line of the mechanism.
    - a. Readings shall be taken at 100 percent and 120 percent of the AGMA rated torque.
    - b. The test load shall be applied and noted on the torque overload device.
  5. The manufacturer's service representative shall certify that the alarm and motor cut-out torque of the drives as calibrated in the manufacturer's shop are in proper operation to shut down the units as specified.
- C. Operation Test:
1. Fill clarifier with water to its operating level and operate mechanism continuously at its maximum speed for a period of not less than 48 HRS.
    - a. At no time during the operating tests shall the equipment exceed the rated torque or exhibit indications of binding or uneven operation.
    - b. Record torque values as registered on the drive mechanism torque indicator and motor amperage (all three (3) phases) at 3 HR intervals.
  2. After successful completion of the fully submerged operating test, operate the mechanism at full speed with no more than 1.5 FT of water at the sidewall in the tank for a period of not less than 6 HRS.
    - a. Record data as described above.
  3. If the mechanism exceeds rated torque or the mechanism exhibits indications of binding or improper adjustment, then:
    - a. Contractor shall immediately halt the tests and remedy the problem.
    - b. Repeat the tests after completion of necessary repairs or adjustments.
    - c. Failure to successfully complete the test in three (3) attempts is sufficient cause for rejection.
    - d. Failure to complete the testing program as outlined in the preceding paragraphs is sufficient cause for the Owner to require that the equipment be removed from the Project.
- D. Mechanism Speed Setting:
1. After completion of the specified field tests, fit the drive mechanism with a sprocket set which shall provide the rake arms with a tip speed of as specified in this design specification.

## END OF SECTION

**SECTION 11220**  
**VERTICAL FLOCCULATION EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- A. The flocculator assembly shall be supplied complete with electric motor, gear reducer, shaft and impeller assembly. Entire assembly shall be mounted on common baseplate or pedestal. Flocculator support structures and access walkways shall be designed and supplied by the flocculator manufacturer in general conformance to the configurations shown on the contract drawings. Tank and other appurtenances necessary for proper operation shall be provided by others in accordance with the manufacturer's recommendations.
- B. The flocculator shall be the product of a recognized manufacturer that has been regularly engaged in the design and manufacturing of flocculators for at least ten years.
- C. The manufacturer shall be responsible for the detailed design of the equipment to be furnished, the preparation of the required submittal data including operation and maintenance manuals, and technical supervision for installation of the equipment.

**PART 2 - PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS**

- A. Acceptable manufacturers for this item are Lightnin-SPX Corporation, Rochester NY, Philadelphia Mixer, Palmyra, PA or equivalent.
- B. This specification is designed on the provision of LIGHTNIN 70 Series type impeller mixers as manufactured by LIGHTNIN-SPX CORPORATION, Rochester, NY. Any modification or adjustment to the electrical, structural, hydraulic operation and modeling, mixer support structures, and any other portion of the design required to support the change in equipment manufacturer shall be completed at the Contractor's expense and must be approved by the Engineer and Owner. All information necessary for this shall be supplied to the Engineer within ten (10) calendar days following the bid opening for review.
- C. For the approval of mixers other than the model identified as the basis of design, manufacturers are required to submit complete 3D computational fluid dynamics model(s) to confirm "equal" operational design. Supplier shall optimize the hydraulic mixing capabilities of the mixers by determining the optimum mixing directions, positioning of flow openings between stages, determination of short cutting flow paths and recommendations for modifications, and selection of optimum impeller diameter, hydrofoil type, horsepower, and RPM.

**2.2 EQUIPMENT**

- A. All shafts, impellers, and wetted parts shall be constructed of 316 stainless steel.
- B. Only drive units specifically designed for agitator service for water treatment and suitable for 24 hour per day operation under moderate to heavy shock loads per the latest applicable AGMA standards for enclosed gear drives will be acceptable.

- C. All drives shall be parallel shaft, single or double reduction helical gear combination to ensure maximum efficiency coupled with the convenience of mounting, maintenance, and installation. Gears shall be ground to AGMA Quality Level 10. Gear drive shafts shall be oversized to accommodate all overhung loads. The speed reducer shall be furnished with independent bearing support construction. Worm gear drives are not acceptable. As a minimum, drive gears shall be combination helical/bevel gearing, and shall meet the requirements of AGMA Quality No. 10 under AGMA standard 390.03.
- D. General maintenance, specifically including motor changes, speed changes, replacement of all anti-friction bearings (except the bearing supporting the output shaft), and oil system maintenance, shall not require removal of the speed reducer housing from its foundation.
- E. The thermal rating of the speed reducer shall exceed the design mechanical rating to eliminate the need for external coolers. External cooling devices are not acceptable. The manufacturer shall certify, in writing, that the speed reducer is designed to the applicable AGMA Standards.
- F. High speed input shaft bearings shall be heavy duty ball bearings. Intermediate shaft bearings and low speed output shaft bearings shall be tapered roller bearings. All bearings shall have a minimum B-10 rating of 100,000 hours. Pressed-on type or sliding, journal type bearings are not acceptable.
- G. Gear reducer lubrication shall be by means of an oil bath. All bearings shall be oil lubricated. Oil drain and fill plugs shall be easily accessible. All oil-lubricated bearings shall be located above the top of the main lubricant drain and above the speed reducer oil sump. No oil seals will be permitted below the operating oil level for rotating elements.
- H. A single extended oil drain shall be provided, positioned for easy access, and located to leave not more than 1/4" of residual oil within the drive housing. Following the initial run-in period, oil changes shall not be required at less than 2500-hour intervals when operated continuously at ambient conditions above freezing. A dipstick shall be provided to measure oil levels for all systems.
- I. Gear reducer shall carry a minimum AGMA service factor of 2.00 based on motor nameplate horsepower. Rating is based on electric motor driven speed reducers operating 24 hours per day under moderate to heavy shock load conditions. All drive components shall be designed for outdoor or other environmental conditions, as noted.
- J. The output shaft bearings shall be grease-lubricated with grease inlet and relief accessible from the mounting surface. Grease fittings serving the mixer and output shaft bearings are to be plainly marked and each grease fitting shall be protected with a removable cover.
- K. Each drive unit shall include a cast-iron or fabricated steel housing. All non-machined housing, retainer and cage interior surfaces shall be coated with gear case sealer by spraying or dipping. Assembled drives shall be pressure tested.
- L. All speed reducer openings below the operating oil level shall be positively sealed with compressible gaskets. No O-ring seals will be allowed.
- M. The speed reducer shall be provided with lifting lugs.
- N. The speed reducer shall be spin-tested before shipment.
- O. The speed reducer output shaft shall be constructed and supported so that the shaft deflection caused by operating loads does not affect alignment of the anti-friction bearings or cause misalignment of gearing during mixer operation.
- P. The flocculator impeller shaft shall be capable of transmitting 150% of maximum operating torque and should be supported on two-adapter type antifriction bearings. These bearings shall carry only the impeller shaft loads and shall include a thrust bearing capable of supporting the entire weight of the vertical impeller shaft and impellers. Systems requiring the alignment of three bearings are not acceptable. The output shaft shall be totally overhung; the use of submerged or steady bearings is not permitted. When turned over by hand, impeller shaft runout or deflection shall not exceed 1/4" per 10' of length.

- Q. Separation of the shaft supporting the turbine from the speed reducer shall not require disassembly or other disturbance of the speed reducer internal gearing. A bolted connection to a hollow output shaft or a flanged coupling joining the reducer output and impeller shafts may be used. Flanged connection for impeller assembly is an acceptable alternate.
- R. When stabilizing devices are used in conjunction with mixing impellers, the rotating speed of the unit shall not exceed 80% of the first natural frequency, in air, of the shaft and impeller assembly. The rotational speed shall not exceed 40% of the natural frequency when impellers operate for prolonged periods at or near the liquid surface or when impellers without stabilizing devices are used.
- S. Impellers shall be three blade, axial flow type design, attached to a central hub. Impeller attachment to shaft shall be by means of a cast hub with blades bolted to the hub. Method of attachment shall be adequate to transmit 150% of operating torque.
- T. The impeller shall be of such design, and operate at such rotational speed that dynamic balancing is not required to prevent damaging vibration.
- U. The drive motor shall be a completely enclosed, fan cooled, high efficiency, severe duty, electric induction motor with insulation meeting Class B, a weather tight junction box and a 1.15 service factor. The manufacturer's standard starting code will apply unless otherwise specified. The insulation shall be non-hygroscopic. The maximum motor speed shall be 1800 rpm. Motor shall be name plate rated for operation on 208 V, 3-PH, 60 Hz current. Motor shall be connected to gear reducer through a flexible coupling. Coupling shall be rated for 150% of operating load. Motors shall be inverter type and be controlled by variable frequency drives.
- V. Normally, painted surfaces not subject to continuous wetting by the process liquid shall include motors and speed reducers. Surfaces of the drive assembly to be painted shall be commercially blast-cleaned before application of the manufacturer's standard primer. Preparation shall meet Steel Structures Painting Council Surface Preparation Specification and Pictorial Vis 1 (Latest Editions), SSPC-SP6. All blast cleaning shall take place before any assembly occurs. Painting requirements elsewhere in this specification shall not require or permit abrasive blasting of final assemblies with rotating components. Finish-coat painted surfaces shall be capable of withstanding heat such that minimum discoloration of the paint takes place at temperatures below 250 F. The paint shall have a minimum salt spray resistance of 400 hours, and shall withstand most solvents if removed within five (5) minutes. The paint shall be modified styrenated alkyd enamel.
- W. See variable frequency drive(s) specifications for detail on controls.

### **2.3 ACCESS WALKWAYS AND SUPPORT STRUCTURES**

- A. All walkways and support structures required to support and access the flocculation equipment shall be designed and furnished by the flocculation equipment manufacturer or structural engineering subcontractor thereof and must be licensed in the state of Kentucky. See Section 05500 – 2.18 for more details and requirements.

## EQUIPMENT SCHEDULE

B. Equipment shall be furnished in accordance with the following schedule:

	<b>Stage 1/Unit #1</b>	<b>Stage 2/Unit #2</b>	<b>Stage 3/Unit #3</b>
<b>Unit Model #: Lightnin/SPX</b>	76-QP-7.5	75-QP-3.0	74-QP-1.0
<b>Horsepower</b>	7.5	3.0	1.0
<b>Impeller Diameter (in):</b>	128"	110"	92"
<b>Impeller Height Above Basin Floor (ft):</b>	Per Manufacturer	Per Manufacturer	Per Manufacturer
<b>Maximum G Value Required</b>	$75 \text{ s}^{-1}$	$50 \text{ s}^{-1}$	$20 \text{ s}^{-1}$
<b>Control Type</b>	VFD	VFD	VFD
<b>No. Units per Stage</b>	1	1	1
<b>Total Units on Project</b>	2	2	2

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF EQUIPMENT

- A. The Contractor shall install flocculation equipment in strict accordance with the manufacturer's installation drawings, instructions and recommendations. The Contractor shall obtain the services of a field supervisor employed by the manufacturer for inspection of completed installation and startup of equipment.
- B. Installation and assembly shall be performed in strict accordance with the manufacturer's drawings and written instructions.
- C. Supervisory services of a factory trained field service engineer shall be provided for a period of one day on-site for inspection of completed installation and startup of equipment. The services of such designated manufacturer representative shall be included in the contract price. The service times specified above shall be considered as a full eight (8) hours on site.

### 3.2 ACCEPTANCE TESTS

- A. After installation of the equipment and after completion of the services of the manufacturer's representative the Contractor shall operate each unit to demonstrate its ability to operate continuously without vibration, jamming, or overheating and to perform its specified functions satisfactorily.
- B. All defects and defective equipment shall be corrected promptly or replaced at the expense of the Contractor.
- C. All final adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

**END OF SECTION**

## **SECTION 11221**

### **RAPID MIXER**

#### **PART 1 - GENERAL**

##### **1.1 SCOPE OF WORK**

- A. The Rapid Mixer assembly shall be supplied complete with electric motor, gear reducer, shaft and impeller assembly. Entire assembly shall be mounted on common baseplate or pedestal. Mixer supports, and other appurtenances necessary for proper operation shall be provided by others in accordance with the manufacturer's recommendations.
- B. The Mixer shall be the product of a recognized manufacturer that has been regularly engaged in the design and manufacturing of Rapid Mixers for at least ten years.
- C. The manufacturer shall be responsible for the detailed design of the equipment to be furnished, the preparation of the required submittal data including operation and maintenance manuals, and technical supervision for installation of the equipment.

#### **PART 2 - PRODUCTS**

##### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Acceptable manufacturers for this item are Lightnin-SPX Corporation, Rochester NY, Philadelphia Mixer, Palmyra, PA or equivalent.
- B. This specification is designed on the provision of LIGHTNIN 10 Series type mixer(s) as manufactured by LIGHTNIN-SPX CORPORATION, Rochester, NY. Any modification or adjustment to the electrical, structural, hydraulic operation, and any other portion of the design required to support the change in equipment manufacturer shall be completed at the Contractor's expense and must be approved by the Engineer and Owner. All information necessary for this shall be supplied to the Engineer within ten (10) calendar days following the bid opening for review.

The manufacturer of the rapid mixer(s) as specified in this section must be the same manufacturer that supplies the vertical flocculation equipment as specified in section 11220 to maintain a single source of supply and warranty service for all mixers.

##### **2.2 EQUIPMENT**

- A. All shafts, impellers, and wetted parts shall be constructed of 316 stainless steel.
- B. Only drive units specifically designed for agitator service for water treatment and suitable for 24 hour per day operation under moderate to heavy shock loads per the latest applicable AGMA standards for enclosed gear drives will be acceptable.
- C. All drives shall be parallel shaft, single or double reduction helical gear combination to ensure maximum efficiency coupled with the convenience of mounting, maintenance, and installation. Gears shall be ground to AGMA Quality Level 10. Gear drive shafts shall be oversized to accommodate all overhung loads. The speed reducer shall be furnished with independent bearing support construction. Worm gear drives are not acceptable. As a minimum, drive gears shall be combination helical gearing, and shall meet the requirements of AGMA Quality No. 10 under AGMA standard 390.03.
- D. General maintenance, specifically including motor changes, speed changes, replacement of all anti-friction bearings (except the bearing supporting the output shaft), and oil system maintenance, shall not require removal of the speed reducer housing from its foundation.

- E. The thermal rating of the speed reducer shall exceed the design mechanical rating to eliminate the need for external coolers. External cooling devices are not acceptable. The manufacturer shall certify, in writing, that the speed reducer is designed to the applicable AGMA Standards.
- F. High speed input shaft bearings shall be heavy duty ball bearings. Intermediate shaft bearings and low speed output shaft bearings shall be tapered roller bearings. All bearings shall have a minimum B-10 rating of 100,000 hours. Pressed-on type or sliding, journal type bearings are not acceptable.
- G. Gear reducer lubrication shall be by means of an oil bath. All bearings shall be oil lubricated. Oil drain and fill plugs shall be easily accessible. All oil-lubricated bearings shall be located above the top of the main lubricant drain and above the speed reducer oil sump. No oil seals will be permitted below the operating oil level for rotating elements.
- H. A single extended oil drain shall be provided, positioned for easy access, and located to leave not more than 1/4" of residual oil within the drive housing. Following the initial run-in period, oil changes shall not be required at less than 2500-hour intervals when operated continuously at ambient conditions above freezing. A dipstick shall be provided to measure oil levels for all systems.
- I. The low speed output shaft shall incorporate a sealed dry well design. Open dry well designs will not be acceptable. This dry well seal must prevent oil leakage along the drive output shaft if incidental overflow, i.e., standing waves due to excessive vibration and/or tipping during maintenance, occurs. The top surface of the dry well shall be sufficiently above the dynamic oil level of the gear drive.
- J. Gear reducer shall carry a minimum AGMA service factor of 1.5 based on motor nameplate horsepower. Rating is based on electric motor driven speed reducers operating 24 hours per day under moderate to heavy shock load conditions. All drive components shall be designed for outdoor or other environmental conditions, as noted.
- K. The output shaft bearings shall be grease-lubricated with grease inlet and relief accessible from the mounting surface. Grease fittings serving the mixer and output shaft bearings are to be plainly marked and each grease fitting shall be protected with a removable cover.
- L. Each drive unit shall include a cast-iron or fabricated steel housing. All non-machined housing, retainer and cage interior surfaces shall be coated with gear case sealer by spraying or dipping. Assembled drives shall be pressure tested.
- M. All speed reducer openings below the operating oil level shall be positively sealed with compressible gaskets. No O-ring seals will be allowed.
- N. The speed reducer shall be provided with lifting lugs.
- O. The speed reducer shall be spin-tested before shipment.
- P. The speed reducer output shaft shall be constructed and supported so that the shaft deflection caused by operating loads does not affect alignment of the anti-friction bearings or cause misalignment of gearing during mixer operation.
- Q. The Mixer impeller shaft shall be capable of transmitting 150% of maximum operating torque and should be supported on two-adapter type antifriction bearings. These bearings shall carry only the impeller shaft loads and shall include a thrust bearing capable of supporting the entire weight of the vertical impeller shaft and impellers. Systems requiring the alignment of three bearings are not acceptable. The output shaft shall be totally overhung; the use of submerged or steady bearings is not permitted. When turned over by hand, impeller shaft runout or deflection shall not exceed 1/4" per 10' of length.
- R. The mixer shaft shall be connected to the output shaft of the speed reducer by means of a split removable coupling accessible from outside the tank and located above the reducer. The rigid coupling shall be designed to minimize runout to less than 1/4" per 10' of shaft length. Designs, which require a coupling below the speed reducer, are not acceptable.



- S. When stabilizing devices are used in conjunction with mixing impellers, the rotating speed of the unit shall not exceed 80% of the first natural frequency, in air, of the shaft and impeller assembly. The rotational speed shall not exceed 40% of the natural frequency when impellers operate for prolonged periods at or near the liquid surface or when impellers without stabilizing devices are used.
- T. Impellers shall be four blade A200, axial flow type design, attached to a central hub. Impeller attachment to shaft shall be by means of a cast hub with blades bolted to the hub. Method of attachment shall be adequate to transmit 150% of operating torque. An extended keyway shall be provided of sufficient length to permit adjustment of the axial position 18 inches up in three-inch increments from the design location.
- U. The impeller shall be of such design, and operate at such rotational speed that dynamic balancing is not required to prevent damaging vibration.
- V. The standard NEMA C-Frame vertical motor shall be of "cast iron construction" with cast iron fan cover, diagonally split conduit box. The motor insulation shall be Class "F" and the motor shall have a 1.15 service factor on sine wave power or 1.0 service factor on inverter duty applications. Motor shall be name plate rated for operation on 208 V, 3-PH, 60 Hz current. Motor shall be connected to gear reducer through a flexible coupling. Coupling shall be rated for 150% of operating load. Motors shall be inverter type and be controlled with a variable frequency drive.
- W. Normally, painted surfaces not subject to continuous wetting by the process liquid shall include motors and speed reducers. Surfaces of the drive assembly to be painted shall be commercially blast-cleaned before application of the manufacturer's standard primer. Preparation shall meet Steel Structures Painting Council Surface Preparation Specification and Pictorial Vis 1 (Latest Editions), SSPC-SP6. All blast cleaning shall take place before any assembly occurs. Painting requirements elsewhere in this specification shall not require or permit abrasive blasting of final assemblies with rotating components. Finish-coat painted surfaces shall be capable of withstanding heat such that minimum discoloration of the paint takes place at temperatures below 250 F. The paint shall have a minimum salt spray resistance of 400 hours, and shall withstand most solvents if removed within five (5) minutes. The paint shall be modified styrenated alkyd enamel.
- X. See variable frequency drive(s) specifications for detail on controls.

**2.3 EQUIPMENT SCHEDULE**

- A. Equipment shall be furnished in accordance with the following schedule:

	<b>Rapid Mix #1 Unit</b>
<b>Unit Model #: Lightnin/SPX</b>	17-QP-20
<b>Horsepower</b>	20
<b>Impeller Diameter (in):</b>	44"
<b>Impeller Height above Basin Floor (ft)</b>	Per Manufacturer
<b>G Value Required</b>	750 s <sup>-1</sup>
<b>Control Type</b>	VFD
<b>No. Units Required</b>	1

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF EQUIPMENT**

- A. The Contractor shall install mixing equipment in strict accordance with the manufacturer's installation drawings, instructions and recommendations. The Contractor shall obtain the services of a field supervisor employed by the manufacturer for inspection of completed installation and startup of equipment.
- B. Installation and assembly shall be performed in strict accordance with the manufacturer's drawings and written instructions.
- C. Supervisory services of a factory trained field service engineer shall be provided for a minimum of 8-hours on-site for inspection of completed installation and startup of equipment. The services of such designated manufacturer representative shall be included in the contract price.

### **3.2 ACCEPTANCE TESTS**

- A. After installation of the equipment, and after completion of the services of the manufacturer's representative the Contractor shall operate each unit to demonstrate its ability to operate continuously without vibration, jamming, or overheating and to perform its specified functions satisfactorily.
- B. All defects and defective equipment shall be corrected promptly or replaced at the expense of the Contractor.
- C. All final adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

**END OF SECTION**

**SECTION 11227**  
**TUBE SETTLER SYSTEM**  
**DISASSEMBLY, SAFE HANDLING, STORAGE, AND REINSTALLATION**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- A. Contractor may choose, at its own expense, to disassemble, store during construction, and reinstall, following construction, the tube settler modules, protective surface grating, effluent trough(s), and support systems as shown on the Drawings and as specified herein if necessary to complete the construction modifications as set forth in the contract drawings. **However, the intent of the project as designed is to complete construction efforts while the tube settlers are in place.** Any broken or damaged tube settlers and tube settler appurtenances damaged during construction shall be replaced at the Contractor's expense for all materials and labor associated therewith.

**1.2 REFERENCE STANDARDS**

- A. NSF International - Standard 61
- B. AWS D-1.1 Structural Welding Code

**1.3 DEFINITIONS**

- A. Tube Settler Module - Tube settlers are comprised of multiple tubular channels sloped at an angle of about 60°, which allow enhanced settling characteristics and accumulation of solids within a settling basin. Modules are 2 feet in height, 1 or 2 feet wide, up to 10 feet in length as required by the tank geometry and support structure.
- B. Protective Surface Grating - Interlocking panels, a minimum 1-1/4 inches thick, to absorb hydraulic impact (during washdowns), provide operator access, provide a protective layer from foot traffic, and added UV protection to tube settler area.
- C. Support System - Structural system designed to support tube settlers, baffles, and troughs as required.
- D. Baffle System - System to direct water through tube settler area.
- E. Trough/Weir System - Effluent launders to remove clarified water from sedimentation basin.

**1.4 SYSTEM DESCRIPTION**

- A. System includes tube settler modules, protective surface grating, baffles, weirs, and support structures.
- B. Interface with Adjacent System(s): Disassemble, store, and reinstall tube settler system within clarifier as recommended by tube settler manufacturer.
  - 1. Existing Tube Settler Manufacturer: Brentwood
  - 2. Sales Representative: Henry P. Thompson Co.
  - 3. Contact Information: 513-248-3200 / www.hpthompson.com

**1.5 SUBMITTALS**

- A. Provide a written plan for successfully completing the requirements of this specification.

**1.6 QUALITY ASSURANCE**

- A. Execution Requirements:

1. Disassemble/handle/store/reinstall tube settler system in accordance with manufacturer's written instructions.
2. Tube settler system manufacturer shall provide services of a qualified representative onsite to provide instructions during disassembly and reinstallation efforts.

## **1.7 STORAGE & HANDLING**

### **A. Storage:**

1. All material and equipment shall be disassembled, stored, handled, and installed in such a manner as to not degrade quality or serviceability.
2. The tube settling modules shall not be stacked more than four high (8 ft.) (one over the other).
3. All modules shall be stacked such that the PVC sheet planes are in a vertical position.
4. A light colored covering shall be provided for all modules required to be stored in the open for more than 60 days. Clear covers are prohibited. Black is not allowed.
5. Covers shall not be wrapped tightly around the media. There should be at least a 6" air gap between the cover and top of media. The ends of the cover should be securely anchored on all sides with at least a 12" air gap at the bottom. These covers should provide shading while allowing air to pass through to prevent heat from building up.
6. Modules and covers, when applicable, shall be inspected at least once per week. Make any minor repairs to covers or restack any modules that could have fallen.

### **B. Handling:**

1. Tube modules shall remain on pallets until ready to install.
2. Any abusive handling of the modules shall not be permitted. Workmen shall be careful in placing the tube modules and avoid any damage to the corners and tube edges.
3. Personnel shall not stand or walk directly on top of the modules, except when absolutely necessary. Such foot traffic may occur only on the surface of a 4' x 4' x 3/8" thick plywood sheet placed on the modules to prevent any damage to the tube edges.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

#### **A. Field measurements:**

1. Field verify all dimensions affecting installation.
2. Layout all work prior to installation.

#### **B. Protection:**

1. Protect adjacent surfaces, piping and other items.
2. Protect tube settler material as outlined in Section 1.6A.

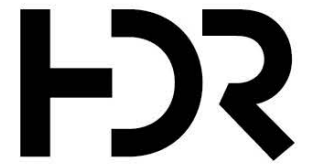
### **3.2 RE- INSTALLATION**

- A. The tube settler modules shall be disassembled and reinstalled in accordance with manufacturer's recommendations.

### **3.3 RE-INSTALLATION SUPERVISION**

- A. Tube settler system manufacturer shall provide the services of a qualified field installation supervisor. Installation supervision shall be provided for 2 working days (not to exceed 8 hours per day). This time period will be for 2 trips with 1 day per trip.

## **END OF SECTION**

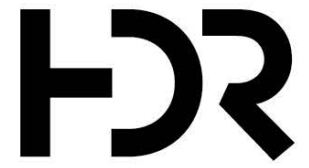


**D I V I S I O N 1 2**

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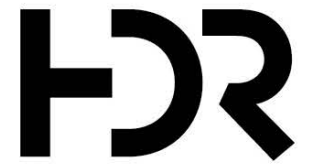
**Furnishings (Not Used)**

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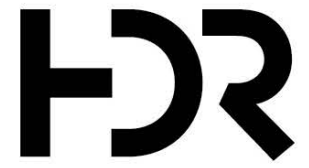
**D I V I S I O N 1 3**

**Special Construction (Not Used)**



**D I V I S I O N 1 4**

**Conveyance Systems (Not Used)**



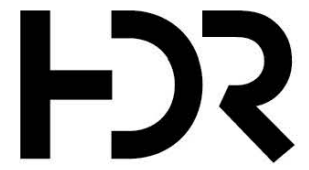
**D I V I S I O N 1 5**

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Mechanical (Not Used)

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D I V I S I O N 1 6

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Electrical

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**SECTION 16010**  
**ELECTRICAL: BASIC REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Basic requirements for electrical systems.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Division 11 – Equipment.
  - 4. Division 16 - Electrical.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Aluminum Association (AA).
  - 2. American Iron and Steel Institute (AISI).
  - 3. ASTM International (ASTM):
    - a. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - b. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 4. ETL Testing Laboratories (ETL).
  - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C2, National Electrical Safety Code (NESC).
  - 6. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 7. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 8. Underwriters Laboratories, Inc. (UL).
- B. Where UL test procedures have been established for the product type, use UL or ETL approved electrical equipment and provide with the UL or ETL label.

**1.3 DEFINITIONS**

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
  - 1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
  - 2. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
  - 3. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

**1.4 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of submittal process.
  - 2. See Division 11 and individual specification sections for submittal requirements for products defined as equipment.
  - 3. General requirements:

- a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
  - b. Include data sheets that include manufacturer's name and product model number.
    - 1) Clearly identify all optional accessories.
  - c. Acknowledgement that products are UL or ETL listed or are constructed utilizing UL or ETL recognized components.
  - d. Manufacturer's delivery, storage, handling and installation instructions.
  - e. Product installation details.
  - f. See individual specification sections for any additional requirements.
- B. Operation and Maintenance Manuals:
- 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content process of Operation and Maintenance Manuals.
- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01300 and all Specification Sections shall be submitted simultaneously.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. See Specification Section 01710.
- B. Protect nameplates on electrical equipment to prevent defacing.

### **1.6 AREA DESIGNATIONS**

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
  - 1. Outdoor areas:
    - a. Wet.
    - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
  - 2. Indoor areas:
    - a. Dry.
    - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

### **1.7 CLASSIFICATION OF AREAS**

- A. Unless shown or specified otherwise, the following classifications shall apply:
  - 1. Indoor areas, general purpose NEMA Type 1 materials and methods shall be used:
    - a. Electrical Rooms.
  - 2. Non-hazardous, watertight, corrosive-resistant NEMA 250, Type 4X materials and methods shall be used:
    - a. All outdoor areas.
    - b. Chemical Building.
    - c. Pump rooms.
    - d. All areas not covered above.

### **1.8 EXISTING CONDITIONS AND DIMENSIONS**

- A. The work in this Contract will primarily be performed in or around existing facilities which must remain functional. This Contractor must maintain the required items and/or systems functional without additional effort by plant personnel and at no extra costs to the Owner.
- B. The Contractor is responsible for verifying all existing conditions, elevations, dimensions, etc., and providing his finished work to facilitate existing conditions.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, refer to specific Division 16 Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Provide all components of a similar type by one (1) manufacturer.

### **2.2 MATERIALS**

- A. Electrical Equipment Support Pedestals and/or Racks:
  - 1. Approved manufacturers:
    - a. Modular strut:
      - 1) Unistrut Building Systems.
      - 2) B-Line.
      - 3) Globe Strut.
    - 2. Material requirements:
      - a. Modular strut:
        - 1) Stainless steel: AISI Type 316.
        - 2) PVC coated galvanized steel: ASTM A123 or ASTM A153 and 20 mil PVC coating.
        - 3) Aluminum: AA Type 6063-T6.
      - b. Mounting hardware:
        - 1) Stainless steel.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
  - 1. NFPA 70.
  - 2. IEEE C2.
  - 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
  - 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
  - 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
  - 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
  - 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
  - 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
  - 4. See Specification Section 16120 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.

- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operating and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
  - 1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
    - a. Receptacle on exterior wall of building (to center): 18 IN.
    - b. Receptacle in non-architecturally finished areas (to center): 48 IN.
    - c. Safety switch (to center of operating handle): 54 IN.
    - d. Separately mounted motor starter (to center of operating handle): 54 IN.
    - e. Pushbutton or selector switch control station (to center): 48 IN.
    - f. Panelboard (to top): 72 IN.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
  - 1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 IN in equipment location without the Engineer's approval.
- K. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
  - 1. Do not cut, or weld to, building structural members.
  - 2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- L. Provide corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas.
- M. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- N. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- O. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- P. Identify electrical equipment and components as required.

### **3.2 FIELD QUALITY CONTROL**

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. Cleaning:
  - 1. See Specification Section 01710.
- D. The protective coating integrity of support structures and equipment enclosures shall be maintained.
  - 1. Repair galvanized components utilizing a zinc rich paint.
  - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
  - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
  - 4. Repair surfaces which will be inaccessible after installation prior to installation.

5. See Specification Section 16130 for requirements for conduits and associated accessories.

E. Replace nameplates damaged during installation.

### **3.3 DEMONSTRATION**

A. Demonstrate equipment in accordance with Specification Section 16080.

### **3.4 PERMITS AND APPROVALS**

A. The Contractor shall obtain all permits necessary. The Contractor shall furnish inspection by an agency licensed or otherwise qualified to perform electrical inspections in the Commonwealth of Kentucky.

B. The Contractor shall notify the Electrical Inspector, in writing, immediately upon the start of the work and **a copy of the notice shall be sent to the Engineer.**

C. Inspection shall be scheduled for rough-in as well as finish work. The rough-in inspection shall be divided into as many inspections as may become necessary to cover all roughing-in.

D. All costs incidental to the electrical inspection shall be borne by the Contractor.

E. The Contractor shall furnish certificates of final approval by the electrical inspector and final payment will be withheld until he has presented the Engineer with the aforementioned certificate of approval.

F. When it is determined by the Electrical Inspector that materials, equipment or installations shown on the Drawings or specified herein are in violation of the National Electrical Code, the Contractor shall contact the Engineer immediately. The Contractor shall be prepared to tell the Engineer the Articles of the National Electrical Code that are violated by the project requirements.

**END OF SECTION**

## **SECTION 16060**

### **GROUNDING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for grounding system(s).
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16080 - Acceptance Testing.
  - 5. Section 16120 - Wire and Cable - 600 Volt and Below.
  - 6. Section 16130 - Raceways and Boxes.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
  - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
  - 3. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
      - 1) Article 250, Grounding and Bonding.
      - 2) Article 610, Cranes and Hoists.
      - 3) Article 620, Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts.
  - 4. Underwriters Laboratories, Inc. (UL):
    - a. 467, Grounding and Bonding Equipment.
- B. Assure ground continuity is continuous throughout the entire Project.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data.
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Grounding clamps, terminals and connectors.
    - b. See Specification Section 16010 for additional requirements.

#### **PART 2 - PRODUCTS**

##### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Grounding clamps, connectors and terminals:

- a. Burndy.
- b. Harger Lightning Protection.
- c. Heary Brothers.
- d. Joslyn.
- e. Robbins Lightning Protection.
- f. Thomas & Betts (Blackburn).
- g. Thompson.

## 2.2 COMPONENTS

- A. Wire and Cable:
  - 1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
  - 2. Insulated conductors: Color coded green, per Specification Section 16120.
- B. Conduit: As specified in Specification Section 16130.
- C. Grounding Clamps, Connectors and Terminals:
  - 1. Mechanical type:
    - a. Standards: UL 467.
    - b. High copper alloy content.
  - 2. Compression type for interior locations:
    - a. Standards: UL 467.
    - b. High copper alloy content.
    - c. Non-reversible.
    - d. Terminals for connection to bus bars shall have two bolt holes.
  - 3. Compression type suitable for direct burial in earth or concrete:
    - a. Standards: UL 467, IEEE 837.
    - b. High copper alloy content.
    - c. Non-reversible.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  - 1. Install products in accordance with manufacturer's instructions.
  - 2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
  - 3. Remove paint, rust, or other nonconducting material from contact surfaces before making ground connections.
  - 4. Where ground conductors pass through floor slabs or building walls provide nonmetallic sleeves.
  - 5. Do not splice grounding conductors except at ground rods.
- B. Supplemental Grounding Electrode:
  - 1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
  - 2. Metal light poles:
    - a. Grounding conductor: Bare #6 AWG minimum.
  - 3. Equipment support rack and pedestals mounted outdoors:
    - a. Connect metallic structure to a ground rod.
    - b. Grounding conductor: #6 AWG minimum.
- C. Raceway Bonding/Grounding:
  - 1. All metallic conduit shall be installed so that it is electrically continuous.
  - 2. All conduits to contain a grounding conductor with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.



3. NFPA 70 required grounding bushings shall be of the insulating type.
4. Provide double locknuts at all panels.
5. Bond all conduit, at entrance and exit of equipment, to the equipment ground bus or lug.
6. Provide bonding jumpers if conduits are installed in concentric knockouts.
7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

D. Equipment Grounding:

1. All utilization equipment shall be grounded with an equipment ground conductor.

**3.2 FIELD QUALITY CONTROL**

A. Acceptance testing:

1. See Specification Section 16080.

**END OF SECTION**

**SECTION 16080**  
**ACCEPTANCE TESTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Basic requirements for acceptance testing.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Division 11 - Equipment.
  - 4. Division 16 - Electrical.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 400, Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems.
    - b. 400.3, Guide for Partial Discharge Testing of Power Cable Systems in a Field Environment.
  - 2. InterNational Electrical Testing Association (NETA):
    - a. ATS, Standard for Acceptance Testing Specifications for Electric Power Equipment and Systems.
  - 3. Nationally Recognized Testing Laboratory (NRTL).
  - 4. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
    - a. 455-78-B, Optical Fibres - PART 1-40: Measurement Methods and Test Procedures - Attenuation.
- B. Phasing Diagram:
  - 1. Coordinate with Utility Company for phase rotations and Phase A, B and C markings.
    - a. Create a phasing diagram showing the coordinated phase rotations with generators and motors through the transformers.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. See Division 11 for electrical equipment and connection testing plan submittal requirements.
- B. Miscellaneous Submittals:
  - 1. See Specification Section 16010 for requirements for the mechanics and administration of the submittal process.
  - 2. Prior to energizing equipment:
    - a. Coordinated phasing diagram.
    - b. Photocopies of continuity tests.
  - 3. Within two (2) weeks after successful completion of Demonstration Period (Commissioning Period):
    - a. Single report containing information including:
      - 1) Summary of Project.
      - 2) Information from pre-energization testing.

- 3) See testing and monitoring reporting requirements in Division 11.

## **PART 2 - PRODUCTS**

### **2.1 FACTORY QUALITY CONTROL**

- A. Provide Division 16 equipment with all routing factory tests required by the applicable industry standards or NRTL.
- B. Factory testing will not be accepted in lieu of field acceptance testing requirements specified in this Specification Section and Division 11.

## **PART 3 - EXECUTION**

### **3.1 FIELD QUALITY CONTROL**

- A. General:
  1. See Division 11.
  2. Complete electrical testing in three (3) phases:
    - a. Pre-energization testing phase.
    - b. Equipment energized with no load.
    - c. Equipment energized under load.
  3. Perform testing in accordance with this Specification Section and NETA ATS.
- B. Electrical Equipment and Connections Testing Program:
  1. See individual Division 11 specification section for specific equipment testing.
  2. See individual Division 16 specification sections for equipment specific testing requirements.
  3. Test all electrical equipment.
    - a. Perform all required NETA testing.
    - b. Perform all required NETA testing plus the optional testing identified with each specific type of equipment in Article 3.2 of this Specification Section.

### **3.2 SPECIFIC EQUIPMENT TESTING REQUIREMENTS**

- A. Panelboards:
  1. Perform inspections and tests per NETA ATS 7.1.
  2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
- B. Cable - Low Voltage:
  1. Perform inspections and tests per NETA ATS 7.3.2.
- C. Low Voltage Molded Case Circuit Breakers:
  1. Perform inspections and tests per NETA ATS 7.6.1.1.
  2. Components:
    - a. Test all components per applicable paragraphs of this Specification Section and NETA ATS.
    - b. Thermal magnetic breakers: Visual and mechanical inspection per NETA ATS only.
    - c. Solid state trip type: Visual and mechanical inspection and electrical tests per NETA ATS.
  3. Record as-left settings.
- D. Grounding:
  1. Perform inspections and tests per NETA ATS 7.13.
  2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.

- E. Ground Fault Protection:
  - 1. Perform inspections and tests per NETA ATS 7.14.
  - 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
  - 3. Perform the following optional tests per NETA ATS:
    - a. Control wiring insulation resistance.
  - 4. Perform the following additional tests for four-wire systems:
    - a. Primary current injection into switchgear bus with test set configured to simulate transformer source and high current jumper used to simulate unbalanced load and ground fault conditions.
    - b. Verify no tripping for unbalanced load on each feeder and each main breaker.
    - c. Verify no tripping for unbalanced load across tie breaker for dual-source schemes.
    - d. Verify tripping for ground fault on load side of feeder each feeder and on each main bus.
    - e. Verify tripping for ground fault on a single feeder and on each main bus through tie breaker(s) for multiple-source schemes.
- F. Motors:
  - 1. Perform inspections and tests per NETA ATS 7.15.
  - 2. See Division 11.
- G. Motor Controllers:
  - 1. Perform inspections and tests per NETA ATS 7.16.
  - 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
- H. Control System Functional Test:
  - 1. Perform test upon completion of equipment acceptance tests.
  - 2. The test is to prove the correct interaction of all sensing, processing and action devices.
  - 3. Develop a test plan and parameters for the purpose of evaluating the performance of the system.
  - 4. Perform the following tests:
    - a. Verify the correct operation of all interlock safety devices for fail-safe functions in addition to design function.
    - b. Verify the correct operation of all sensing devices, alarms and indicating devices.
  - 5. Systems to be tested:

**END OF SECTION**

**SECTION 16120**  
**WIRE AND CABLE: 600 VOLT AND BELOW**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Material and installation requirements for:
    - a. Building wire.
    - b. Power cable.
    - c. Control cable.
    - d. Instrumentation cable.
    - e. Wire connectors.
    - f. Insulating tape.
    - g. Pulling lubricant.
- B. Related Specification Sections include but are not necessarily limited to:
1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  2. Division 1 - General Requirements.
  3. Section 16010 - Electrical: Basic Requirements.
  4. Section 16080 - Acceptance Testing.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. Canadian Standards Association (CSA).
  2. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
  3. Insulated Cable Engineers Association (ICEA):
    - a. S-58-679, Standard for Control Cable Conductor Identification.
  4. National Electrical Manufacturers Association (NEMA):
    - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
  5. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
    - a. WC 57/S-73-532, Standard for Control Cables.
    - b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
  6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
    - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
  7. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
    - a. 568, Commercial Building Telecommunications Cabling Standard.
  8. Underwriters Laboratories, Inc. (UL):
    - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
    - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
    - c. 467, Standard for Safety Grounding and Bonding Equipment.
    - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
    - e. 486C, Standard for Safety Splicing Wire Connections.
    - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
    - g. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

### 1.3 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Instrumentation Cable:
  - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
  - 2. The following are specific types of instrumentation cables:
    - a. Analog signal cable:
      - 1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 Vdc) signals, using No. 16 AWG and smaller conductors.
      - 2) Commonly used types are defined in the following:
        - a) TSP: Twisted shielded pair.
        - b) TST: Twisted shielded triad.
    - b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.
- D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Wire connectors.
      - 2) Insulating tape.
      - 3) Cable lubricant.
    - b. See Specification Section 16010 for additional requirements.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 16010.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Building wire, power and control cable:
    - a. Aetna Insulated Wire.
    - b. Alphawire.
    - c. Cerrowire.
    - d. Encore Wire Corporation.
    - e. General Cable.
    - f. Okonite Company.
    - g. Southwire Company.
  - 2. Instrumentation cable:
    - a. Analog cable:
      - 1) Alphawire.

- 2) Belden Inc.
- 3) General Cable.
- 3. Wire connectors:
  - a. Burndy Corporation.
  - b. Buchanan.
  - c. Ideal.
  - d. IlSCO.
  - e. 3M Co.
  - f. Teledyne Penn Union.
  - g. Thomas and Betts.
  - h. Phoenix Contact.
- 4. Insulating and color coding tape:
  - a. 3M Co.
  - b. Plymouth Bishop Tapes.
  - c. Red Seal Electric Co.

## 2.2 MANUFACTURED UNITS

- A. Building Wire:
  - 1. Conductor shall be copper with 600 V rated insulation.
  - 2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
  - 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  - 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
  - 5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.
- B. Power Cable:
  - 1. Conductor shall be copper with 600 V rated insulation.
  - 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  - 3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
  - 4. Number of conductors as required, including a bare ground conductor.
  - 5. Individual conductor color coding:
    - a. ICEA S-58-679, Method 4.
    - b. See PART 3 of this Specification Section for additional requirements.
  - 6. Conform to NFPA 70 Type TC and IEEE 1202 or CSA FT-4.
- C. Control Cable:
  - 1. Conductor shall be copper with 600 V rated insulation.
  - 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  - 3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
  - 4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
    - a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
  - 5. Individual conductor color coding:
    - a. ICEA S-58-679, Method 1, Table E-2.
    - b. See PART 3 of this Specification Section for additional requirements.
  - 6. Conform to NFPA 70 Type TC and IEEE 1202, CSA FT-4 or NFPA 262.
- D. Electrical Equipment Control Wire:
  - 1. Conductor shall be copper with 600 V rated insulation.

2. Conductors shall be stranded.
  3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  4. Conform to UL 44 for Type SIS insulation.
  5. Conform to UL 83 for Type MTW insulation.
- E. Instrumentation Cable:
1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  2. Analog cable:
    - a. Tinned copper conductors.
    - b. 300 V or 600 V PVC insulation with PVC jacket.
    - c. Twisted with 100 percent foil shield coverage with drain wire.
    - d. Six (6) twists per foot minimum.
    - e. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
    - f. Conform to IEEE 1202 or CSA FT-4 or NFPA 262, UL 2250, UL 1581 and NFPA 70 Type ITC.
  3. Digital cable:
    - a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
    - b. Horizontal voice and data cable:
      - 1) Category 6 per TIA/EIA/ANSI 568.
      - 2) Cable shall be label-verified.
      - 3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
      - 4) Conductors: No. 24 AWG solid untinned copper.
      - 5) Rated CMP per NFPA 70.
    - c. Conform to IEEE 1202 or CSA FT-4 or NFPA 262 and NFPA 70 Type ITC.
- F. Wire Connectors:
1. Twist/screw on type:
    - a. Insulated pressure or spring type solderless connector.
    - b. 600 V rated.
    - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
    - d. Phase and neutral conductors: Conform to UL 486C.
  2. Compression and mechanical screw type:
    - a. 600 V rated.
    - b. Ground conductors: Conform to UL 467.
    - c. Phase and neutral conductors: Conform to UL 486A.
  3. Terminal block type:
    - a. High density, screw-post barrier-type with white center marker strip.
    - b. 600 V and ampere rating as required, for power circuits.
    - c. 600 V, 20 ampere rated for control circuits.
    - d. 300 V, 15 ampere rated for instrumentation circuits.
    - e. Conform to NEMA ICS 4 and UL 486A.
- G. Insulating and Color Coding Tape:
1. Pressure sensitive vinyl.
  2. Premium grade.
  3. Heat, cold, moisture, and sunlight resistant.
  4. Thickness, depending on use conditions: 7, 8.5, or 10 mil.
  5. For cold weather or outdoor location, tape must also be all-weather.
  6. Color:
    - a. Insulating tape: Black.
    - b. Color coding tape: Fade-resistant color as specified herein.
  7. Comply with UL 510.



- H. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Permitted Usage of Insulation Types:
  - 1. Type XHHW-2:
    - a. Building wire and power and control cable in architectural and non-architectural finished areas.
    - b. Building wire and power and control cable in conduit below grade.
  - 2. Type THHN/THWN and THHN/THWN-2:
    - a. Building wire and power and control cable No. 8 AWG and smaller in architectural and non-architectural finished areas.
  - 3. Type SIS and MTW:
    - a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.
- B. Conductor Size Limitations:
  - 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
  - 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
  - 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
  - 1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

\* Orange when it is a high leg of a 120/240 V Delta system.

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
- b. Conductors larger than No. 6 AWG:
  - 1) Insulated phase and neutral conductors shall be identified by one (1) of the following methods:
    - a) Continuous colored outer finish along its entire length.
    - b) 3 IN of colored tape applied at the termination.
  - 2) Insulated grounding conductor shall be identified by one (1) of the following methods:
    - a) Continuous green outer finish along its entire length.
    - b) Stripping the insulation from the entire exposed length.
    - c) Using green tape to cover the entire exposed length.
  - 3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.
- 2. Power cables ICEA S-58-679, Method 4 with:
  - a. Phase and neutral conductors identified with 3 IN of colored tape, per the Table herein, applied at the terminations.

- b. Ground conductor: Bare.
- 3. Control cables ICEA S-58-679, Method 1, Table E-2:
  - a. When a bare ground is not provided, one (1) of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
  - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
  - 1. Where specifically indicated on the Drawings.
  - 2. Where field conditions dictate and written permission is obtained from the Engineer.
  - 3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
    - a. The combinations shall comply with the following:
      - 1) 12 Vdc, 24 Vdc and 48 Vdc may be combined.
      - 2) 125 Vdc shall be isolated from all other AC and DC circuits.
      - 3) AC control circuits shall be isolated from all DC circuits.
  - 4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
    - a. The combinations shall comply with the following:
      - 1) Analog signal circuits may be combined.
      - 2) Digital signal circuits may be combined but isolated from analog signal circuits.
  - 5. Multiple branch circuits for lighting, receptacle and other 120 Vac circuits are allowed to be combined into a common raceway.
    - a. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
      - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
      - 2) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one (1) end only.
  - 1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).
- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
  - 1. Feeder and branch power circuits:
    - a. Device outlet boxes:
      - 1) Twist/screw on type connectors.
    - b. Junction and pull boxes and wireways:
      - 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
      - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
    - c. Motor terminal boxes:
      - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
      - 2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.
  - 2. Control circuits:
    - a. Junction and pull boxes: Terminal block type connector.
    - b. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.

3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Engineer.
    - a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.
    - b. Junction and pull boxes: Terminal block type connector.
    - c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.
  4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- H. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 mil vinyl tape.
  2. For insulating splices and taps of No. 6 AWG wire or larger: 10 mil vinyl tape.
  3. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.
- I. Color Coding Tape Usage: For color coding of conductors.

### **3.2 FIELD QUALITY CONTROL**

- A. Acceptance Testing:
1. See Specification Section 16080.

**END OF SECTION**

**SECTION 16130**  
**RACEWAYS AND BOXES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Conduits.
    - b. Conduit fittings.
    - c. Conduit supports.
    - d. Outlet boxes.
    - e. Pull and junction boxes.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16135 - Electrical: Exterior Underground.
  - 5. Section 16140 - Wiring Devices.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Iron and Steel Institute (AISI).
  - 2. ASTM International (ASTM):
    - a. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - b. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - c. D2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit (IMC).
    - c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
    - d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
  - 4. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
    - a. C80.1, Electric Rigid Steel Conduit (ERSC).
    - b. C80.3, Steel Electrical Metallic Tubing (EMT).
    - c. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
  - 5. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 6. Underwriters Laboratories, Inc. (UL):
    - a. 1, Standard for Flexible Metal Conduit.
    - b. 6, Standard for Electrical Rigid Metal Conduit - Steel.
    - c. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
    - d. 360, Standard for Liquid-Tight Flexible Steel Conduit.
    - e. 467, Grounding and Bonding Equipment.
    - f. 514A, Metallic Outlet Boxes.
    - g. 514B, Conduit, Tubing, and Cable Fittings.
    - h. 651, Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.

- i. 797, Electrical Metallic Tubing - Steel.
- j. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
- k. 886, Standard for Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Conduit fittings.
      - 2) Support systems.
    - b. See Specification Section 16010 for additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Identify dimensional size of pull and junction boxes to be used.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. See Specification Section 16010.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Rigid metallic conduits:
    - a. Allied Tube and Conduit Corporation.
    - b. Triangle PWC Inc.
    - c. Western Tube and Conduit Corporation.
    - d. Wheatland Tube Company.
    - e. LTV Steel Company.
  - 2. Rigid nonmetallic conduit:
    - a. Carlon.
    - b. Cantex.
    - c. Osburn Associates.
  - 3. Flexible conduit:
    - a. AFC Cable Systems.
    - b. Anamet, Inc.
    - c. Electri-Flex.
    - d. Flexible Metal Hose Company.
    - e. International Metal Hose Company.
    - f. Triangle PWC Inc.
    - g. LTV Steel Company.
  - 4. Conduit fittings and accessories:
    - a. Appleton.
    - b. Carlon.
    - c. Cantex.
    - d. Crouse-Hinds.
    - e. Killark.
    - f. Osburn Associates.
    - g. OZ Gedney Company.
    - h. RACO.

- i. Steel City.
- j. Thomas and Betts.
- 5. Support systems:
  - a. Unistrut Building Systems.
  - b. B-Line Systems Inc.
  - c. Kindorf.
  - d. Minerallac Fastening Systems.
  - e. Caddy.
- 6. Outlet, pull and junction boxes:
  - a. Appleton Electric Co.
  - b. Crouse-Hinds.
  - c. Killark.
  - d. O-Z/Gedney.
  - e. Steel City.
  - f. Raco.
  - g. Bell.
  - h. Hoffman Engineering Co.
  - i. Wiegmann.
  - j. B-Line Circle AW.
  - k. Adalet.
  - l. Rittal.

## **2.2 RIGID METALLIC CONDUITS**

- A. Rigid Galvanized Steel Conduit (RGS):
  - 1. Mild steel with continuous welded seam.
  - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
  - 3. Threads galvanized after cutting.
  - 4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
  - 5. Standards: NEMA/ANSI C80.1, UL 6.
- B. Rigid Aluminum Conduit (RAC):
  - 1. Meet requirements of UL 514B.
  - 2. Type: threaded, copper-free.
  - 3. Set screw fittings not permitted.

## **2.3 FLEXIBLE CONDUIT**

- A. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):
  - 1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
  - 2. Extruded PVC outer jacket positively locked to the steel core.
  - 3. Liquid and vaportight.
  - 4. Standard: UL 360.

## **2.4 CONDUIT FITTINGS AND ACCESSORIES**

- A. Fittings for Use with RGS and RAC:
  - 1. General:
    - a. In hazardous locations listed for use in Class I, Groups C and D locations.
  - 2. Locknuts:
    - a. Threaded steel or malleable iron.
    - b. Gasketed or non-gasketed.
    - c. Grounding or non-grounding type.
  - 3. Bushings:
    - a. Threaded, insulated metallic.
    - b. Grounding or non-grounding type.
  - 4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.

5. Couplings:
    - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
    - b. Threadless type: Gland compression or self-threading type, concrete tight.
  6. Unions: Threaded galvanized steel or zinc plated malleable iron.
  7. Conduit bodies (ells and tees):
    - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
    - b. Standard and mogul size.
    - c. Cover:
      - 1) Clip-on type with stainless steel screws.
      - 2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
  8. Conduit bodies (round):
    - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
    - b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
  9. Sealing fittings:
    - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
    - b. Standard and mogul size.
    - c. With or without drain and breather.
    - d. Fiber and sealing compound: UL listed for use with the sealing fitting.
  10. Expansion couplings:
    - a. 2 IN nominal straight-line conduit movement in either direction.
    - b. Galvanized steel with insulated bushing.
    - c. Gasketed for wet locations.
    - d. Internally or externally grounded.
  11. Expansion/deflection couplings:
    - a. 3/4 IN nominal straight-line conduit movement in either direction.
    - b. 30-degree nominal deflection from the normal in all directions.
    - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
    - d. Internally or externally grounded.
    - e. Watertight, raintight and concrete tight.
  12. Standards: UL 467, UL 514B, UL 886.
- B. Fittings for Use with FLEX:
1. Connector:
    - a. Zinc plated malleable iron.
    - b. Squeeze or clamp-type.
  2. Standard: UL 514B.
- C. Weather and Corrosion Protection Tape:
1. PVC based tape, 10 mils thick.
  2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
  3. Used with appropriate pipe primer.

## **2.5 ALL RACEWAY AND FITTINGS**

- A. Mark Products:
1. Identify the nominal trade size on the product.
  2. Stamp with the name or trademark of the manufacturer.

## **2.6 OUTLET BOXES**

- A. Cast Outlet Boxes:
1. Zinc plated cast iron or die-cast copper free aluminum with manufacturers standard finish.
  2. Threaded hubs and grounding screw.
  3. Styles:
    - a. "FS" or "FD".

- b. "Bell".
- c. Single or multiple gang and tandem.
- d. "EDS" or "EFS" for hazardous locations.
- 4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
- 5. Standards: UL 514A, UL 886.

B. See Specification Section 16140 for wiring devices, wallplates and coverplates.

## 2.7 PULL AND JUNCTION BOXES

### A. NEMA 1 Rated:

- 1. Body and cover: 14 GA minimum, galvanized steel or 14 GA minimum, steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
- 2. With or without concentric knockouts on four (4) sides.
- 3. Flat cover fastened with screws.

### B. NEMA 4 Rated:

- 1. Body and cover: 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
- 2. Seams continuously welded and ground smooth.
- 3. No knockouts.
- 4. External mounting flanges.
- 5. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
- 6. Cover with oil resistant gasket.

### C. NEMA 4X Rated (metallic):

- 1. Body and cover: 14 GA Type 304 or 316 stainless steel.
- 2. Seams continuously welded and ground smooth.
- 3. No knockouts.
- 4. External mounting flanges.
- 5. Hinged door and stainless steel screws and clamps.
- 6. Door with oil-resistant gasket.

### D. NEMA 4X Rated (Nonmetallic):

- 1. Body and cover: Ultraviolet light protected fiberglass-reinforced polyester boxes.
- 2. No knockouts.
- 3. External mounting flanges.
- 4. Hinged door with quick release latches and padlocking hasp.
- 5. Door with oil resistant gasket.

### E. NEMA 12 Rated:

- 1. Body and cover:
  - a. 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
  - b. Type 5052 H-32 aluminum, unpainted.
- 2. Seams continuously welded and ground smooth.
- 3. No knockouts.
- 4. External mounting flanges.
- 5. Non-hinged cover held closed with captivated cover screws threaded into sealed wells or hinged cover held closed with stainless steel screws and clamps.
- 6. Flat door with oil resistant gasket.

### F. Miscellaneous Accessories:

- 1. Rigid handles for covers larger than 9 SF or heavier than 25 LBS.
- 2. Split covers when heavier than 25 LBS.
- 3. Weldnuts for mounting optional panels and terminal kits.
- 4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.

### G. Standards: NEMA 250, UL 50.



## 2.8 SUPPORT SYSTEMS

- A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
  - 1. Material requirements:
    - a. Stainless steel: AISI Type 316.
- B. Single Conduit and Outlet Box Support Fasteners:
  - 1. Material requirements:
    - a. Stainless steel.
    - b. Malleable iron.

## 2.9 OPENINGS AND PENETRATIONS IN WALLS AND FLOORS

- A. Sleeves, smoke and fire stop fitting through walls and floors.

## PART 3 - EXECUTION

### 3.1 RACEWAY INSTALLATION - GENERAL

- A. Shall be in accordance with the requirements of:
  - 1. NFPA 70.
  - 2. Manufacturer instructions.
- B. Size of Raceways:
  - 1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
  - 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
    - a. Conduit: 3/4 IN.
    - b. Wireway: 2-1/2 IN x 2-1/2 IN.
- C. Field Bending and Cutting of Conduits:
  - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
  - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
  - 3. Prepare tools and equipment to prevent damage to the PVC coating.
  - 4. Degrease threads after threading and apply a zinc rich paint.
  - 5. Debur interior and exterior after cutting.
- D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
  - 1. Repair galvanized components utilizing a zinc rich paint.
  - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
  - 3. Repair surfaces which will be inaccessible after installation prior to installation.
- F. Remove moisture and debris from conduit before wire is pulled into place.
  - 1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
  - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
  - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.

- I. Fill openings in walls, floors, and ceilings and finish flush with surface.

### **3.2 RACEWAY ROUTING**

- A. Raceways shall be routed in the field unless otherwise indicated.
  1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
  2. Run in straight lines parallel to or at right angles to building lines.
  3. Do not route conduits:
    - a. Through areas of high ambient temperature or radiant heat.
    - b. In suspended concrete slabs.
  4. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
  5. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 degrees of bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All rigid conduits within a structure shall be installed exposed except as follows:
  1. As indicated on the Drawings.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:
  1. Between instrumentation and telecommunication: 1 IN.
  2. Between instrumentation and 125 V, 48 V and 24 Vdc, 2 IN.
  3. Between instrumentation and 600 V and less AC power or control: 6 IN.
  4. Between instrumentation and greater than 600 Vac power: 12 IN.
  5. Between telecommunication and 125 V, 48 V and 24 Vdc, 2 IN.
  6. Between telecommunication and 600 V and less AC power or control: 6 IN.
  7. Between telecommunication and greater than 600 Vac power: 12 IN.
  8. Between 125 V, 48 V and 24 Vdc and 600 V and less AC power or control: 2 IN.
  9. Between 125 V, 48 V and 24 Vdc and greater than 600 Vac power: 2 IN.
  10. Between 600 V and less AC and greater than 600 Vac: 2 IN.
  11. Between process, gas, air and water pipes: 6 IN.
- D. Conduits shall be installed to eliminate moisture pockets.
  1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.
- G. Provide all required openings in walls, floors, and ceilings for conduit penetration.

### **3.3 RACEWAY APPLICATIONS**

- A. Permitted Raceway Types Per Wire or Cable Types:
  1. Power wire or cables: All raceway types.
  2. Control wire or cables: All raceway types.
  3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.
  4. Motor leads from a VFD: RAC or shielded VFD cables in all other raceways.
  5. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
  1. Dry areas:
    - a. RAC.
  2. Wet areas:
    - a. RAC.
- C. Permitted Raceway Types Per Routing Locations:

1. Through floor penetrations:
  - a. RGS.
- D. FLEX conduits shall be installed for connections to light fixtures, HVAC equipment and other similar devices.
  1. The maximum length shall not exceed:
    - a. 6 FT to light fixtures.
    - b. 3 FT to all other equipment.
- E. Underground Conduit: See Specification Section 16135.

### **3.4 CONDUIT FITTINGS AND ACCESSORIES**

- A. Conduit Seals:
  1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.
- B. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
  1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- C. Install Expansion Fittings:
  1. Where conduits are exposed to the sun and conduit run is greater than 200 FT.
  2. Elsewhere as identified on the Drawings.
- D. Install Expansion/Deflection Fittings:
  1. Where conduits enter a structure.
    - a. Except electrical manholes and handholes.
    - b. Except where the ductbank is tied to the structure with rebar.
  2. Where conduits span structural expansions joints.
  3. Elsewhere as identified on the Drawings.
- E. Threaded connections shall be made wrench-tight.
- F. Conduit joints shall be watertight:
  1. Where subjected to possible submersion.
  2. In areas classified as wet.
  3. Underground.
- G. Terminate Conduits:
  1. In metallic outlet boxes:
    - a. RGS:
      - 1) Conduit hub and locknut.
      - 2) Insulated bushing and two (2) locknuts.
      - 3) Use grounding type locknut or bushing when required by NFPA 70.
  2. In NEMA 1 rated enclosures:
    - a. RGS and RAC:
      - 1) Conduit hub and locknut.
      - 2) Insulated bushing and two (2) locknuts.
      - 3) Use grounding type locknut or bushing when required by NFPA 70.
  3. In NEMA 12 rated enclosures:
    - a. Watertight, insulated and gasketed hub and locknut.
    - b. Use grounding type locknut or bushing when required by NFPA 70.
  4. In NEMA 4 and NEMA 4X rated enclosures:
    - a. Watertight, insulated and gasketed hub and locknut.
  5. When stubbed up through the floor into floor mount equipment:
    - a. With an insulated grounding bushing on metallic conduits.
    - b. With end bells on nonmetallic conduits.
- H. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

### 3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
  - 1. Dry or wet and/or hazardous areas:
    - a. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
  - 2. Corrosive areas:
    - a. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
    - b. PVC coated steel system consisting of: PVC coated galvanized steel channels and fittings and conduit clamps with stainless steel nuts and hardware.
  - 3. Highly corrosive areas:
    - a. PVC coated steel system consisting of: PVC coated galvanized steel channels and fittings and conduit clamps with stainless steel nuts and hardware.
    - b. Fiberglass system consisting of: Fiberglass channels and fittings, nuts and hardware and conduit clamps.
  - 4. Conduit type shall be compatible with the support system material.
    - a. Stainless steel system may be used with RGS and RAC.
    - b. PVC coated galvanized steel system may be used with RAC, PVC-40 and PVC-80.
    - c. Aluminum system may be used with RAC.
    - d. Fiberglass system may be used with PVC-40 and PVC-80.
- B. Permitted single conduit support fasteners per area designations and conduit types:
  - 1. Dry or wet and/or hazardous areas:
    - a. Material: Zinc plated steel, stainless steel and malleable iron.
    - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
  - 2. Corrosive areas:
    - a. Material: Stainless steel and PVC coat malleable iron or steel.
    - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
  - 3. Conduit type shall be compatible with the support fastener material.
    - a. Stainless steel system may be used with RGS and RAC.
    - b. PVC coated fasteners may be used with PVC-40 and PVC-80.
    - c. Nonmetallic fasteners may be used with PVC-40 and PVC-80.
- C. Conduit Support General Requirements:
  - 1. Maximum spacing between conduit supports per NFPA 70.
  - 2. Support conduit from the building structure.
  - 3. Do not support conduit from process, gas, air or water piping; or from other conduits.
  - 4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 LBS.
    - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
    - b. Conduit hangers:
      - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
    - c. Do not use suspended ceiling support systems to support raceways.
    - d. Hangers in metal roof decks:
      - 1) Utilize fender washers.
      - 2) Not extend above top of ribs.
      - 3) Not interfere with vapor barrier, insulation, or roofing.
  - 5. Conduit support system fasteners:
    - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
    - b. Do not use concrete nails and powder-driven fasteners.

### 3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

- A. General:
  - 1. Install products in accordance with manufacturer's instructions.
  - 2. See Specification Section 16010 and the Drawings for area classifications.
  - 3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
  - 4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.
- B. Outlet Boxes:
  - 1. Permitted uses of metallic outlet boxes:
    - a. Housing of wiring devices:
      - 1) Recessed in all stud framed walls and ceilings.
      - 2) Recessed in poured concrete, concrete block and brick walls of architecturally finished areas and exterior building walls.
  - 2. Permitted uses of cast outlet boxes:
    - a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet, corrosive, highly corrosive and hazardous areas.
    - b. Pull and junction box surface mounted in non-architecturally finished dry, wet, corrosive and highly corrosive areas.
  - 3. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Specification Section 16010.
  - 4. Set device outlet boxes plumb and vertical to the floor.
  - 5. Outlet boxes recessed in walls:
    - a. Install with appropriate stud wall support brackets or adjustable bar hangers so that they are flush with the face of the wall.
    - b. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.
  - 6. Place barriers between switches in boxes with 277 V switches on opposite phases.
  - 7. Back-to-back are not permitted.
  - 8. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.
- C. Pull and Junction Boxes:
  - 1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
    - a. Make covers of boxes accessible.
  - 2. Permitted uses of NEMA 1 enclosure:
    - a. Pull or junction box surface mounted above removable ceiling tiles of an architecturally finished area.
  - 3. Permitted uses of NEMA 4 enclosure:
    - a. Pull or junction box surface mounted in areas designated as wet.
  - 4. Permitted uses of NEMA 4X metallic enclosure:
    - a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.
  - 5. Permitted uses of NEMA 7 enclosure:
    - a. Pull or junction box surface mounted in areas designated as Class I hazardous.
      - 1) Provide PVC coating in corrosive and highly corrosive areas when PVC coated conduit is used.
  - 6. Permitted uses of NEMA 12 enclosure:
    - a. Pull or junction box surface mounted in areas designated as dry.

**END OF SECTION**

**SECTION 16140**  
**WIRING DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Receptacles.
    - b. Device coverplates.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16130 - Raceways and Boxes.
  - 5. Section 16442 - Motor Control Equipment.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. WD 1, General Color Requirements for Wiring Devices.
    - c. WD 6, Wiring Devices - Dimensional Requirements.
  - 2. Underwriters Laboratories, Inc. (UL):
    - a. 20, General-Use Snap Switches.
    - b. 498, Standard for Attachment Plugs and Receptacles.
    - c. 514A, Metallic Outlet Boxes.
    - d. 894, Standard for Switches for Use in Hazardous (Classified) Locations.
    - e. 943, Ground-Fault Circuit-Interrupters.
    - f. 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirement for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 16010 for additional requirements.

**PART 2 - PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Receptacles:
    - a. Bryant.
    - b. Cooper Wiring Devices.
    - c. Hubbell.

- d. Leviton.
- e. Pass & Seymour.
- f. Crouse-Hinds.
- g. Appleton Electric Co.
- h. Killark.

## 2.2 RECEPTACLES

- A. General requirements unless modified in specific requirements paragraph of receptacles per designated areas:
  - 1. Straight blade, Industrial Specification Grade.
  - 2. Brass triple wipe line contacts.
  - 3. One-piece grounding system with double wipe brass grounding contacts and self grounding strap.
  - 4. Back and side wired.
  - 5. Rated 20 A, 125 Vac.
  - 6. High impact nylon body.
  - 7. Receptacle body color:
    - a. Normal power: Gray.
    - b. Generator or UPS power: Red.
  - 8. Types as indicated on the Drawings:
    - a. Normal: Self grounding with grounding terminal.
    - b. Ground fault circuit interrupter: Feed-through type with test and reset buttons.
  - 9. Duplex or simplex as indicated on the Drawings.
  - 10. Configuration: NEMA 5-20R.
  - 11. Standards: UL 498, UL 514A, UL 943, NEMA WD 1, NEMA WD 6.
- B. Dry Non-architecturally Finished Areas:
  - 1. Coverplate:
    - a. Zinc plated malleable iron or galvanized steel.
    - b. Single or multiple gang as required.
- C. Wet Non-architecturally Finished Areas:
  - 1. Coverplate: Weatherproof (NEMA 3R) while in use, gasketed, copper-free aluminum, 2.5 IN minimum cover depth.
- D. Exterior Locations:
  - 1. Coverplate: Weatherproof (NEMA 3R) while in use, gasketed, copper-free aluminum, 2.5 IN minimum cover depth.

## 2.3 MISCELLANEOUS WIRING DEVICES

- A. Manual Motor Starters: Horsepower rated with or without thermal overloads, see Specification Section 16442.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Mount devices where indicated on the Drawings and as scheduled in Specification Section 16010.
- C. See Specification Section 16130 for device outlet box requirements.
- D. Where more than one (1) receptacle is installed in a room, they shall be symmetrically arranged.
- E. Provide blank plates for empty outlets.

**END OF SECTION**

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FTTP BASIN IMPROVEMENTS  
NORTHERN KENTUCKY WATER DISTRICT  
WIRING DEVICES  
16140 - 3



**SECTION 16220**  
**MOTORS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Induction motors.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Division 11 – Equipment.
  - 4. Section 16060 - Grounding.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Bearing Manufacturers Association (ABMA).
  - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 841, Standard for Petroleum and Chemical Industry - Premium-Efficiency, Severe-Duty, Totally-Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors - Up To and Including 370 KW (500 HP).
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. MG 1, Motors and Generators.
  - 4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
- B. Miscellaneous:
  - 1. When motors are furnished with driven equipment, the driven equipment supplier shall be responsible for assembling the motor and driven equipment as a complete unit, correctly aligned and coupled with the coupling or sheave specified on the driven equipment data sheet, and designing for vibration, special, or unbalanced forces resulting from equipment operation.
  - 2. Variable speed equipment applications: The driven equipment manufacturer shall have single source responsibility for coordination of the equipment and VFD system and sure their compatibility.

**1.3 DEFINITIONS**

- A. Inverter Duty Motor: An AC induction motor complying with all requirements of NEMA MG 1 Part 31 for definite-purpose inverter-fed motors.
- B. Abbreviations:
  - 1. DPF - Dripproof Fully Guarded.
  - 2. ODP - Open Dripproof.
  - 3. RTD - Resistance Temperature Detector.
  - 4. TEFC - Totally Enclosed Fan Cooled.
  - 5. TENV - Totally Enclosed Non-ventilated.
  - 6. WP-I - Weather Protected Type I.
  - 7. WP-II - Weather Protected Type II.
  - 8. Motor controllers:
    - a. FVNR - Full Voltage Non-Reversing.
    - b. RVSS - Reduced Voltage Solid State.
    - c. VFD - Variable Frequency Drive.

## 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Identify each motor by driven machine identification.
    - b. Motor manufacturer and model number.
    - c. Complete motor nameplate data.
    - d. Weight.
    - e. NEMA design type.
    - f. Enclosure type.
    - g. Frame size.
    - h. Winding insulation class and temperature rise.
    - i. Starts per hour.
    - j. Performance data:
      - 1) Motor speed-torque curve superimposed over driven machine speed-torque curve during start-up acceleration and at rated terminal voltage and minimum permissible or specified terminal voltage for all motors over 15 HP.
      - 2) Time-current plots with acceleration verses current and thermal damage curves at the operating and ambient temperatures and at rated terminal voltage and minimum permissible or specified terminal voltage for all motors over 15 HP.
      - 3) Guaranteed minimum efficiencies at 100 percent, 75 percent and 50 percent of full load.
      - 4) Guaranteed minimum power factor at 100 percent, 75 percent and 50 percent of full load.
      - 5) Locked rotor and full load current at rated terminal voltage and minimum permissible or specified terminal voltage.
      - 6) Starting, full load and breakdown torque at rated terminal voltage and minimum permissible or specified terminal voltage.
    - k. Bearing data and lubrication system.
    - l. Thermal protection system including recommended alarm and trip settings for winding and bearing RTDs.
  - 3. Fabrication and/or layout drawings:
    - a. Dimensioned outline Drawing.
    - b. Connection diagrams including accessories (strip heaters, thermal protection, etc.).
  - 4. Certifications:
    - a. When utilized with a reduced voltage starter, certify that motor and driven equipment are compatible.
  - 5. Test reports:
    - a. Motor test reports for all testing required in this Specification Section.
- B. Operation and Maintenance Manuals:
  - 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operation and Maintenance Manuals.
  - 2. Installation instructions.
  - 3. Operation and maintenance instructions.
  - 4. Recommended spare parts list.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 01600.
- B. Protect equipment during shipment, handling, and storage by suitable boxes, crates, or other complete enclosures.
  - 1. Protect equipment from exposure to elements and keep thoroughly dry.

- C. Protect painted surfaces against impact, abrasion, discoloration, and other damage.
  - 1. Repaint damaged painted surfaces to satisfaction of Engineer.
- D. Store all motors in a clean and dry indoor location until final installation.
- E. Where space heaters are provided in motors, provide temporary electrical power and operate heaters during storage and after motors are installed in permanent location until equipment is placed in service.
- F. For storage longer than one (1) month, see manufacturers storage instructions.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Baldor.
  - 2. General Electric.
  - 3. Marathon.
  - 4. Rockwell - Reliance.
  - 5. Siemens.
  - 6. TECO-Westinghouse.
  - 7. Toshiba U.S.
  - 8. U.S. Electrical Motors.
  - 9. WEG.

### **2.2 EQUIPMENT**

- A. General Requirements:
  - 1. Standards: NEMA MG 1.
  - 2. Identify each motor by the driven machine identification.
  - 3. An embossed or engraved stainless steel nameplate, with the required NFPA 70 and NEMA data, to be permanently attached to the motor.
  - 4. Maximum motor loading shall not exceed motor nameplate horsepower rating, exclusive of service factor.
  - 5. All motors shall be sized to carry continuously all loads, which may be imposed through their full range of operation.
  - 6. Altitude: For applications above 3300 FT, motors to be specifically designed and certified for operation at the specified altitude.
  - 7. NEMA MG 1, Design B (unless otherwise required), constant speed squirrel-cage induction type having normal starting torque with low starting current.
  - 8. Suitable for the starting method indicated (e.g., full voltage, autotransformer, solid state reduced voltage, VFD, etc.).
  - 9. Where frequent starting occurs, design for frequent starting duty equivalent to duty service required by driven equipment.
  - 10. Lifting devices: Motors weighing 265 LBS or more shall have suitable lifting eyes for installation and removal.
  - 11. Grounding:
    - a. Lug suitable to terminate ground wire in terminal box, sized as indicated on the Drawings.
    - b. Frame ground pad on medium voltage induction motors.
  - 12. Stator windings: Copper.
  - 13. Rotor cage: Aluminum or copper.
  - 14. Motor leads shall be non-wicking with permanent identifiers.
  - 15. Totally enclosed motor to have one-way breather drains.

16. Efficiency:
  - a. Meet NEMA MG 1 (NEMA Premium) efficiencies.
  - b. If motor type, horsepower or speed is not included in the NEMA requirements for NEMA Premium, provide manufacturers "premium energy efficient" design.
17. Power factor:
  - a. Minimum of 80 percent lagging at full load, except on motors with speed slower than 900 RPM.
  - b. Power factor correction capacitors to be utilized when indicated on the Drawings.
18. Service factor:
  - a. 100 hp or less: 1.15.
  - b. Greater than 100 hp: 1.0 unless noted otherwise.
  - c. Inverter duty: 1.0.
19. Standards: NEMA MG 1.

### **2.3 FRACTIONAL INDUCTION MOTORS**

- A. Electrical Ratings:
  1. Appropriate for the voltage system indicated, single phase, 60 Hz.
  2. Dual voltage rated motors (e.g., 115/230 V) are acceptable, provided all leads are brought out to the terminal box and permanently marked.
- B. Enclosure: TENV or TEFC, rolled steel enclosure permitted.
- C. Bearings: Lubricated-for-Life ball bearings
- D. Insulation: Class F insulation with temperature rise not to exceed the insulation class.
- E. Thermal Protection: Integral manual or automatic reset thermal protector.

### **2.4 INDUCTION MOTORS, 600 VOLT AND LESS**

- A. Horizontal Shaft:
  1. Electrical rating:
    - a. Appropriate for the voltage system indicated, 3 PH, 60 Hz.
    - b. Dual voltage rated motors (e.g., 230/460 V) are acceptable, provided all leads are brought out to the terminal box and permanently marked.
  2. Enclosure:
    - a. Cast iron (exception: fan covers can be steel).
    - b. Type: DPGF, TEFC, WP-I or WP-II as indicated in the schedule.
  3. Terminal box:
    - a. Gasketed.
    - b. Diagonally split.
    - c. Field adjustable in 90-degree increments.
    - d. Oversized to accept the required conductors and conduits.
    - e. Located on "F1" side unless specifically indicated to be on the "F2" side.
    - f. Separate terminal box with terminal blocks for winding thermal protection devices (RTD and thermocouples).
  4. Bearings:
    - a. 5 HP and less: Lubricated-for-Life ball bearings.
    - b. Greater than 5 HP:
      - 1) Relubricatable.
      - 2) Antifriction.
      - 3) Minimum rated ABMA L-10 life of 10 years or 100,000 HRS.
  5. Insulation:
    - a. Class F insulation with Class B temperature rise.
  6. Accessories: See the ACCESSORIES Article in PART 2 and the SCHEDULES Article in PART 3.

7. Modifications:
    - a. Inverter duty:
      - 1) At a minimum, applied to motors connected to a VFD.
      - 2) Windings insulated for 1600 peak volts and voltage rise times of 0.1 microseconds.
      - 3) Nameplate identification of meeting NEMA MG 1 Part 31 requirements.
      - 4) Have the following minimum turndown ratio without the use of a blower to provide continuous supply of cooling air over the motor.
        - a) Variable torque: 10:1.
        - b) Constant torque: 6:1.
      - 5) Insulated drive end bearing on all motors.
      - 6) Motors 100 HP and larger, insulated non-drive and bearings.
      - 7) Shaft grounding ring on all motors:
        - a) Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.
        - b) Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.
    - b. Severe duty:
      - 1) Standard: IEEE 841.
      - 2) All cast iron enclosure.
      - 3) Terminal box threaded and gasketed.
      - 4) Internal and external epoxy base paint system.
      - 5) Drain and breather.
- B. Vertical Solid or Hollow Shaft:
1. Electrical rating:
    - a. Appropriate for the voltage system indicated, 3 PH, 60 Hz.
    - b. Dual voltage rated motors (e.g., 230/460 V) are acceptable, provided all leads are brought out to the terminal box and permanently marked.
  2. Enclosure:
    - a. Cast iron.
    - b. Type: DPF, TEFC, WP-I or WP-II as indicated in the schedule.
  3. Terminal box:
    - a. Gasketed.
    - b. Diagonally split.
    - c. Oversized to accept the required conductors and conduits.
    - d. Separate terminal box with terminal blocks for winding thermal protection devices.
  4. Bearings (Solid Shaft):
    - a. Relubricatable.
    - b. Antifriction.
    - c. Minimum rated AMBA L-10 life of 10 years or 100,000 HRS.
  5. Bearings (Hollow Shaft):
    - a. Relubricatable.
    - b. Antifriction.
    - c. Oil or grease lubricated thrust bearings.
    - d. Grease lubricated guide bearings.
    - e. Minimum rated ABMA L-10 life of 10 years or 100,000 HRS.
  6. Insulation:
    - a. Class F insulation with Class B temperature rise.
  7. Accessories: See the ACCESSORIES Article in PART 2 and the SCHEDULES Article in PART 3.
  8. Modifications:
    - a. Inverter duty:
      - 1) At a minimum, applied to motors connected to a VFD.
      - 2) Windings insulated for 1600 peak volts and voltage rise times of 0.1 microseconds.
      - 3) Nameplate identification of meeting NEMA MG 1 Part 31 requirements.

- 4) Have the following minimum turndown ratio without the use of a blower to provide continuous supply of cooling air over the motor.
  - a) Variable torque: 10:1.
  - b) Constant torque: 6:1.
- 5) Insulated drive end bearing on all motors.
- 6) Motors 100 HP and larger the non-drive end shall have an insulated bearing carrier.
- 7) Shaft grounding ring on all motors:
  - a) Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.
  - b) Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.
- b. Severe duty:
  - 1) Standard: IEEE 841.
  - 2) All cast iron enclosure.
  - 3) Terminal box threaded and gasketed.
  - 4) Internal and external epoxy base paint system.
  - 5) Drain and breather.

## 2.5 ACCESSORIES

- A. Thermal Protection:
  1. Thermostats:
    - a. One (1) winding thermostat per phase for shutdown.
    - b. Snap action, bi-metallic, temperature-actuated switch type.
    - c. Normally closed, wired in series.
    - d. Automatic reset.
    - e. Switch point shall be pre-calibrated by the manufacturer.
- B. Space Heaters:
  1. Silicone rubber strip type, 120 V rated.
  2. Provided on:
    - a. All motors 10 HP and larger mounted outdoors.
    - b. Indoor motors in humid environments as indicated.
- C. Vibration/Temperature Monitors:
  1. The new raw water intake pumps, high service pumps and backwash pump shall have vibration/temperature sensors along with a monitoring panel.
  2. The vibration/temperature monitoring system shall be provided as part of the pump equipment specified in Specification Section 11214.

## 2.6 SOURCE QUALITY CONTROL

- A. Test motors in accordance with NEMA, IEEE and manufacturer procedures.
  1. The test shall include but not necessarily be limited to the following:
    - a. Routine test:
      - 1) No-load current and speed at rated voltage and frequency.
      - 2) Locked rotor current.
      - 3) Winding resistance.
      - 4) Vibration check.
      - 5) High potential.
    - b. Complete test (in addition to the routine tests):
      - 1) Rated load temperature rise.
      - 2) Winding resistance.
      - 3) Slip test, measured in percent slip.
      - 4) Locked rotor amperes (3 PH, full voltage).
      - 5) Locked rotor torque.
      - 6) Breakdown torque.
      - 7) Efficiencies tabulated at 100, 75, and 50 percent of full load.

8) Power factor tabulated at 100, 75, and 50 percent of full load.

B. Motors to be tested:

1. As indicated in the schedule.
2. All motors, at a minimum, to receive a routine test.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Ground all motors in accordance with Specification Section 16060.

#### **3.2 FIELD QUALITY CONTROL**

- A. Acceptance Testing: See Specification Division 11.

**END OF SECTION**

**SECTION 16265**  
**VARIABLE FREQUENCY DRIVES: LOW VOLTAGE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Variable frequency drives (VFDs) for operation of inverter duty motors.
    - a. 6-Pulse VFDs:
      - 1) One (1) 20 HP rapid mixer.
      - 2) Two (2) 7 1/2 HP flocculators.
      - 3) Two (2) 3 HP flocculators.
      - 4) Two (2) 1 HP flocculators.
- B. Related Specification Sections include but are not necessarily limited to:
1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  2. Division 1 - General Requirements.
  3. Division 11 - Equipment.
  4. Section 13441 - Control Loop Descriptions.
  5. Section 16010 - Electrical: Basic Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. American National Standards Institute (ANSI).
  2. ETL Testing Laboratories (ETL).
  3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 399, Recommended Practice for Industrial and Commercial Power Systems Analysis.
    - b. 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
    - c. C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
  4. National Electrical Manufacturer's Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. MG 1, Motors and Generators.
  5. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC):
      - 1) Article 430, Motors Motor Circuits, and Controllers..
  6. Occupational Safety and Health Administration (OSHA).
  7. Underwriters Laboratory, Inc. (UL):
    - a. 508, Standard for Industrial Control Equipment.
    - b. 508A, Standard for Industrial Control Panels.
- B. Qualifications:
1. Provide drives that are listed and labeled by UL, ETL, or other Nationally Recognized Testing Laboratory (NRTL) as defined by OSHA regulations, or that have been inspected and subsequent field-labeled by such NRTL.
  2. Where listed drives and other components are installed in a common enclosure, the assembly shall be listed and labeled per UL 508 and UL 508A or equivalent NRTL standard.
    - a. Entire assembly shall be affixed with a UL 508A label "Listed Enclosed Industrial Control Panel" or equivalent NRTL label prior to shipment to the jobsite.
  3. VFD Supplier shall maintain an authorized service organization within 100 miles of the Project Site.



- C. Coordination:
  - 1. The intent of this Specification Section is to allow the VFD manufacturer to provide the best solution for the harmonic and motor protection outlined herein.
    - a. This solution shall include, but not be limited to, all aspects of the distribution system including standby generation, motor feeder cable type and available floor space.
  - 2. Motor and VFD coordination: See Specification Division 11.
  - 3. VFD shall be supplied complete with all required control components.
    - a. Provide control as indicated:
      - 1) On the electrical drawings.
      - 2) As specified in this Specification Section.
      - 3) As specified in the process control system loop descriptions.
        - a) See Specification Section 13441.
    - b. VFD manufacturer shall review the application and provide, at no additional cost to the Owner, the hardware and software necessary to allow the VFD to control the driven equipment motor over its required operating range.
      - 1) These may include, but are not limited to, analog and digital interface modules, communication interface modules, switches, lights and other devices.
    - c. Coordinate control devices with devices furnished with driven equipment such as vibration switches, thermal sensors, leak detectors, etc.
  - 4. Verify plan dimensions with equipment space requirements as indicated on the Drawings.
    - a. Equipment which exceeds the allotted maximum dimensions may not be acceptable.
    - b. Equipment which reduces clear work space below the minimums established by the NFPA 70 will not be acceptable.

### 1.3 DEFINITIONS

- A. Variable Torque (VT):
  - 1. Defines a load characteristic in which the torque delivered from the motor to the load is reduced as speed is reduced below full rated.
  - 2. This type of load permits the VFD and the motor to operate at reduced output current at reduced speed.
- B. Constant Torque (CT):
  - 1. Defines a load characteristic in which the torque delivered from the motor to the load remains constant as speed is varied.
  - 2. This type of load requires the VFD to be able to continuously deliver rated output current over the entire speed range.
- C. Constant Horsepower:
  - 1. Defines a load characteristic in which the torque delivered from the motor to the load is reduced as the speed is increased.
  - 2. This characteristic is required for operation of the VFD and motor above rated frequency to maintain output current within the rated value.
- D. Inverter Duty Motor: An AC induction motor complying with all requirements of NEMA MG 1 Part 31 for definite-purpose inverter-fed motors.
- E. Standard Motor: An AC induction motor that fails to comply with one (1) or more requirements of NEMA MG 1 Part 31.
- F. Low Voltage: 600 Vac or less.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Provide a schedule for each VFD including the following information:
    - a. Equipment Tag Number.

- b. VFD Complete Catalog Number.
  - c. VFD Amp Frame Size.
  - d. Variable or Constant Torque Rating Basis.
  - e. Rated Input Current.
  - f. Rated Continuous Output Current.
  - g. Rated Short Circuit Current.
  - h. VFD cable type specified (shielded or non-shielded).
  - i. VFD Maximum Motor Lead Length for the type of cable used.
  - j. Motor Manufacturer.
  - k. Motor Frame Size.
  - l. Motor Full Load Amps.
  - m. Motor Service Factor.
  - n. As installed motor Lead Length.
  - o. VFD options provided to meet harmonic or motor protection specifications.
3. Submit VFD Shop Drawings concurrently with driven equipment and motor Shop Drawings.
  4. Product technical data:
    - a. Complete electrical ratings and performance specifications confirming compliance with specified ratings and performance.
    - b. Maximum rate of heat rejection from VFD and all related components and associated cooling requirements.
    - c. Manufacturer's installation instructions.
    - d. Manufacturer's programming and operating instructions.
    - e. See Specification Section 16010 for additional requirements.
  5. Fabrication and/or layout drawings:
    - a. Top, front and side exterior views, with details showing maximum overall dimensions of enclosure, mounting provisions and conduit/cable entry provisions.
    - b. Identify minimum clearances from other VFDs or electrical equipment required for proper cooling at top, bottom, side and back of enclosure.
    - c. Three-line diagrams showing AC schematic of VFD, input, output and bypass devices including device ratings.
    - d. Interior layout drawings showing location of all components within enclosure, field wiring terminal boards, and power and grounding connections.
    - e. Field wiring diagrams showing locations and sizes of all electrical connections, ground terminations, and requirements for shielded wire usage or any other special installation considerations.
  6. Certifications:
    - a. Submit with Shop Drawings:
      - 1) Identification and location of closest authorized service organization.
      - 2) Harmonic analysis at each PCC per Harmonic Protection Requirements Article.
    - b. Submit prior to shipment:
      - 1) Certified factory test reports confirming compliance with specified requirements.
    - c. Submit after installation:
      - 1) Certified field service reports showing:
        - a) Each VFD is operational.
        - b) Each VFD and its driven equipment motor are compatible.
        - c) Each VFD responds correctly to the input control signals.
        - d) Critical frequencies of the drive system and that the VFD has been set to lockout these frequencies.
        - e) Measured harmonic levels per Harmonic Protection Requirements Article.
        - f) Measured motor terminal peak voltages per Motor Protection Requirements Article.

**B. Operations and Maintenance Manuals:**

1. See Specification Section 01730 for requirements for:
  - a. The mechanics and administration of the submittal process.

- b. The content of Operation and Maintenance Manuals.
- 2. Approved copy of VFD schedule per Submittals Article.
- 3. Manufacturer's instruction manuals.
- 4. Troubleshooting procedures with a cross-reference between symptoms and corrective recommendations.
- 5. Connection data to permit removal and installation of recommended smallest field-replaceable parts.
- 6. Recommended spare parts list.
- 7. Commissioning sheets showing "as-left" values of all user-programmable or adjustable drive parameters.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Allen Bradley, Powerflex 753 Series
  - 2. Cutler-Hammer.
  - 3. Siemens.
  - 4. Square D Company.
  - 5. Toshiba.

### **2.2 GENERAL**

- A. VFDs shall consist of a rectifier-DC bus-inverter combination producing a sine-coded pulse-width-modulated (PWM) output voltage waveform.
- B. VFDs, whether installed in motor control center (MCC) construction or separately-mounted, shall constitute a complete combination motor controller per NFPA 70, Article 430 and shall provide the following per the requirements of that article without the addition of any external components or devices.
  - 1. Motor control.
  - 2. Motor overload protection.
  - 3. Motor and motor branch circuit short circuit and ground fault protection.
  - 4. Motor and controller disconnecting means.
- C. It is the intent of this Specification that VFDs shall be an "engineered" or "configured" drive package in which the VFD chassis, all input, output and bypass power devices, VFD accessories, ancillary switches, contactors, relays, and related control devices are selected, furnished, factory-assembled and -tested by the VFD manufacturer in a single enclosure requiring only connection of the power supply circuit, motor branch circuit, and external control wiring in the field.

### **2.3 PERFORMANCE AND DESIGN REQUIREMENTS**

- A. Application:
  - 1. VFD(s) shall be of sufficient capacity and shall provide a quality of output waveform for stepless motor control from 10 to 100 percent of base speed of the driven equipment.
  - 2. VFDs shall be compatible with:
    - a. Inverter duty induction motors.
  - 3. VFDs shall be suitable for Constant Torque (CT) or Variable Torque (VT) applications.
    - a. VFD manufacturer shall coordinate with the manufacturer of the driven equipment to identify CT and VT applications.
  - 4. VFDs shall be designed to operate successfully under the following site conditions:
    - a. Ambient:
      - 1) Temperature: 0-40 DegC.
      - 2) 95 percent non-condensing relative humidity.

- b. Elevation: Less than 3,300 FT above MSL.
  - c. Power supply characteristics:
    - 1) 480Vac, 3 PH, 60 Hz, 3 wire, (+/- 10 percent).
    - 2) Effectively grounded.
- B. Ratings and Performance Specifications:
1. Voltage rating:
    - a. Nominal: 460 or 480 Vac, 3 PH, 60 Hz.
    - b. Range for continuous full load operation: +/-10 percent of nominal.
    - c. Voltage imbalance tolerance for full load operation: 3 percent minimum.
  2. Current ratings:
    - a. Continuous:
      - 1) Equal to or greater than the motor nameplate full load.
    - b. Short-term overload:
      - 1) VT: 110 percent for 1 minute.
      - 2) CT: 150 percent for 1 minute.
      - 3) Permissible for 1 minute every 10 minutes continuously.
    - c. Short circuit:
      - 1) 65,000 A RMS SYM, minimum.
      - 2) Where a short circuit rating is not indicated or specified for individual VFDs, each VFD shall have a rating not less than indicated on the Drawings for the MCC, switchboard or panelboard the VFD is supplied from.
      - 3) Where specified short circuit rating indicates additional input impedance is required to protect semiconductors, provide input AC line reactors, whether required to meet harmonic performance specifications or not.
  3. Efficiency:
    - a. 97 percent, minimum, at full speed and full load.
    - b. 93 percent, minimum at 1/2 speed and full load.
  4. Displacement power factor:
    - a. 95 percent, minimum from 50 percent to 100 percent speed and load.
  5. Efficiency and power factor criteria apply from the input terminals to the output terminals of the VFD alone, excluding losses of input and output power circuit accessories.
  6. Frequency drift:
    - a. +0.5 percent of set frequency.
  7. Speed regulation (motor dependent): 3 percent.
  8. Speed range: 10:1.
  9. Control type:
    - a. Volts/Hertz ratio; constant over the entire operating range of the VFD except:
      - 1) When operating under voltage boost.
      - 2) At frequencies over 60 Hz.
- C. Operational Features:
1. Insensitive to input phase sequence.
  2. Continued operation with momentary voltage dips of 25 percent of rated voltage, or single phase condition: 4 second, minimum.
  3. Controls power loss ride-through: 500 msec, minimum.
  4. Electronic reversing.
  5. DC injection braking.
  6. Anti-windmilling: Synchronization of VFD starting frequency with spinning or coasting load, forward or reverse.
  7. Critical frequency band lockout:
    - a. Minimum of three (3) settings.
    - b. Adjustable bandwidth, 1 - 5 Hz.
  8. Capable of operating without the motor connected for start-up and troubleshooting.

- D. The VFD shall be provided with the following minimum user-programmable parameters:
1. Carrier frequency.
  2. Independent maximum and minimum speeds for forward and reverse operation.
  3. Start frequency and hold time.
  4. Independent linear acceleration and deceleration time.
  5. Preset "jog" speed.
  6. Three (3) critical frequency bands.
  7. One (1) preset speed selectable by logic input.
  8. Volts/Hertz ratio.
  9. Voltage boost, magnitude and frequency range.
  10. Process controller gain, offset and bias.
  11. Current limit.
  12. Overcurrent pickup.
  13. Overcurrent delay.
  14. Ground fault pickup.
  15. DC injection level and time.
- E. The VFD shall be designed such that the power circuit components are fully protected from line side disturbances and load side faults:
1. General:
    - a. Shutdown conditions associated with supply circuit conditions which can be corrected external to the VFD-motor system shall be provided with automatic reset, with shutdown cause logged in memory:
      - 1) Input under voltage.
      - 2) Input over voltage.
      - 3) Input under frequency.
      - 4) Input over frequency.
      - 5) Input Phase loss.
      - 6) DC Bus under voltage.
    - b. Shutdown conditions which indicate overload or fault within the VFD, the output circuit, or the motor shall require local manual reset at the VFD, requiring operator intervention.
      - 1) Over temperature.
      - 2) Blown fuse.
      - 3) Component failure.
      - 4) Overload.
      - 5) Short circuit.
      - 6) Ground fault.
      - 7) DC Bus over voltage.
      - 8) External safety input (e.g., motor thermal protection).
      - 9) Logic fault.
    - c. When automatic shutdown occurs, VFD shall restart immediately upon reset, whether automatic or manual.
    - d. VFD shall hold cause of trip data for a minimum of four (4) shutdowns in memory.
      - 1) Data to be accessible through the keypad, local communication link and remotely.
  2. Input protection:
    - a. Input circuit breaker or current-limiting fuses with externally operable disconnect.
      - 1) Fault current interrupting rating equal to or greater than the specified withstand rating of the VFD.
      - 2) Handle padlockable in the OFF position.
    - b. Provide full protection for semiconductors integral to the VFD; units requiring current-limiting fuses or circuit breakers in the supply circuit are not acceptable.
    - c. Incoming line transient suppression.
      - 1) 6000V peak per IEEE C62.41.
      - 2) Phase-to-phase and phase-to-ground protection.
    - d. Sustained over voltage trip.

3. Internal protection:
  - a. Surge suppression and power device snubbers.
  - b. Power devices rated at 2.5 times line voltage.
  - c. Instantaneous over current trip.
  - d. DC bus over voltage trip.
  - e. Power device over temperature trip.
  - f. Control logic circuit malfunction trip.
4. Output protection:
  - a. Inverse-time overload trip:
    - 1) UL Class 10 characteristic.
  - b. Over voltage trip.
  - c. Over frequency trip.
  - d. Short circuit trip.
    - 1) Line to line and line to ground.
  - e. Ground fault trip.
  - f. Provide dv/dt filters inside the VFD enclosure on the inverter output. Output filters shall consist of a minimum of 1.5 percent impedance reactor in conjunction with a resistor and capacitor network to form a damped, low-pass, filter. Using output reactors alone is not acceptable. Output filters shall be manufactured by TCI.

## 2.4 OPERATOR AND REMOTE CONTROL INTERFACE

- A. Drive controls shall be microprocessor-based with on-board human machine interface and both local and remote digital communications capability.
  1. All monitoring and control functions, other than those shutdowns specified to be manual reset only, shall be available both locally and remotely.
- B. Control circuits shall be 120 Vac or 24 Vac or 24 Vdc.
  1. 120 Vac supplied by CPT in the VFD.
    - a. CPT shall have minimum additional capacity of 60 VA greater than that required by control devices.
    - b. CPT shall have two (2) fuses on the primary side and one (1) fuse on the secondary side.
    - c. CPT shall have surge protection on the primary side independent of any other surge protection in the VFD.
  2. 24 Vac or 24 Vdc supplied by Class 2 power supply in the VFD.
    - a. Power supply shall have minimum additional capacity of 33 percent greater than that required by control devices.
    - b. Provide two (2) current-limiting fuses on the AC supply to the power supply.
    - c. Power supply shall have surge protection on the primary side independent of any other surge protection in the VFD.
- C. Operator Interface:
  1. Door mounted sealed keypad, membrane type with LED or LCD display.
    - a. Messages shall be in English and engineering units.
    - b. Drive operating parameters shall be programmable.
    - c. Menu driven.
    - d. Password security.
    - e. Display fault and diagnostic data.
    - f. Operating parameters, fault and diagnostic data maintained in non-volatile memory with historic log of fault and diagnostic data.
    - g. Gold plated plug-in contacts.
  2. Provide indication and control interface, integral in the keypad, as required in the sequence of operation and Drawings.
    - a. Minimum indications:
      - 1) Run.
      - 2) Stop.

- 3) Ready.
  - 4) Alarm.
  - 5) Fault.
  - 6) Local control.
  - 7) Remote control.
  - 8) Control source local.
  - 9) Control source remote.
  - 10) Speed indication.
  - b. Minimum control functions:
    - 1) Local/Remote switch.
    - 2) Stop button.
    - 3) Start button.
    - 4) Reset button.
    - 5) Speed control buttons.
  - 3. Diagnostic indicators located externally on the face of the drive shall show the type of fault responsible for drive warning, shutdown or failure.
    - a. On occurrence of more than one (1) condition, each shall be recorded or indicated by the diagnostics.
- D. Remote Control Interface:
- 1. Local portable computer interface via RS232/RS242 serial communications port:
    - a. Capability to:
      - 1) Start-Stop VFD.
      - 2) Control VFD Speed.
      - 3) Access fault and diagnostic data.
    - 2. Analog and discrete inputs:
      - a. Speed reference (setpoint) signal 4-20 mA DC.
      - b. Isolated process PID controller with user-programmable setpoint, gain, rate, reset and span for accepting a remote 4-20 mA DC process variable signal.
    - 3. Analog and discrete outputs:
      - a. 4-20 mA DC output for remote speed indication, as a function of frequency, calibrated 0 to 100 percent.
      - b. Drive FAULT contacts.
      - c. Drive RUNNING contacts.
      - d. Drive selector switch in AUTO status contacts.
    - 4. Contacts:
      - a. Contacts shall be rated 2 A inductive at 120 Vac.
      - b. All contacts shall be wired to field wiring terminal boards.
    - 5. Drive shutdown on external fault input:
      - a. Provide isolated input for dry contact from external motor or system safety devices to cause immediate shutdown of VFD.
      - b. Safety shutdown to be operable in all operating modes of drive, including local operation from keypad.
      - c. Local safety switch, to driven equipment, auxiliary contact to lock-out VFD from running when safety switch is open.

## 2.5 HARMONIC PROTECTION REQUIREMENTS

- A. All VFDs shall be capable of satisfactory operation from a source having voltage distortion and notch characteristics identified as acceptable for a “dedicated system” in IEEE 519 Table 10.2.
- B. With all VFDs operating under worst-case harmonic current conditions, and the facility supplied either or both the utility and generator sources, the VFDs shall not produce harmonic effects in excess of the following limits at any point of common coupling (PCC).
  - 1. Voltage distortion and notch characteristics: IEEE 519 Table 10.2 for General System.
  - 2. Current distortion: IEEE 519 Table 10.3 based on calculated  $I_{sc}/I_L$  at each PCC.
- C. PCC shall be considered:

1. Building service entrance switchgear, switchboard or MCC.
  2. Each switchgear, or panelboard supplying a VFD branch circuit.
- D. VFD manufacturer shall determine, for their proposed equipment, uncorrected harmonic distortion levels and mitigation techniques required to meet the specified limits and shall furnish the VFD types and all accessory items and equipment necessary to do so, whether specified herein or not.
- E. VFD manufacturer shall provide a harmonic analysis of the distribution system based on their proposed specific equipment characteristics and mitigation techniques confirming that the specified levels are not exceeded.
1. Analysis shall be based on the methodology of IEEE 519 and IEEE 399.
  2. Power system data for analysis shall be taken from the electrical drawings and approved equipment submittals.
    - a. VFDs provided in a package with equipment specified elsewhere, shall be included in the analysis.
- F. Following start-up, with facility at full load operation, provide measurement of harmonic voltage, current and notch characteristics at each PCC according to the requirements of IEEE 519 Section 9.
1. Values in excess of specified limits require correction by contractor and re-measurement.
  2. Provide certification of compliant measurements as part of Field Service Engineer's final report.

## **2.6 MOTOR PROTECTION REQUIREMENTS**

- A. The VFD shall produce a quality of output waveform adequate to allow the motor to produce rated torque at rated RPM continuously without exceeding the temperature rise given in NEMA MG 1 Table 31-2.
- B. Provide motor overload, short circuit and ground fault protection integral to drive electronics.
- C. The VFD shall not produce voltage spikes in excess of the following values at the motor terminals when operated with the feeder types shown on the Drawings and the actual installed feeder lengths.
1. If unmitigated voltage peaks exceed the specified limits, provide output line reactors, filters, or other devices as required to meet the specified limits:
    - a. Inverter duty motors: 1280 V.
    - b. Rise time shall be greater than or equal to 0.1 microsecond.
    - c. Motor lead length and data shall be determined by the Contractor based on the actual routing of the conductors.
- D. Following start-up, provide measurement of peak voltage at the terminals of each motor, unless the lead lengths are 10 percent shorter than the manufacturers published literature for maximum lead length for the type of cable installed.
1. Values in excess of specified limits require correction by contractor and re-measurement.
  2. Provide certification of compliant measurements as part of Field Service Engineer's final report.
- E. All VFD driven motors shall be equipped with shaft grounding rings. Refer to Specification Section 16220 - Motors.

## **2.7 EQUIPMENT CONSTRUCTION**

- A. Fabrication and Assembly:
1. Each VFD system shall be factory-assembled in an enclosure for remote mounting, and shall utilize interchangeable plug-in printed circuit boards and power conversion components wherever possible.
    - a. Factory assembly shall be performed by the VFD manufacturer or authorized agent.



- b. Systems fabricated or assembled in whole or in part by parties other than the VFD manufacturer or authorized agent will not be acceptable.
  - 2. Reactors and/or filters, where required, shall be mounted within or in an ancillary enclosure adjacent to the drive enclosure, or with the Engineer's permission may be mounted in a separate enclosure.
  - 3. Cooling fans, as required, shall be provided to run when drive is running.
  - 4. Enclosures for separately mounted VFD's:
    - a. NEMA Type 1 for installation in Electrical Rooms.
    - b. NEMA Type 12 for installation in other unclassified areas.
- B. Wiring:
  - 1. The wiring in the VFD shall be neatly installed in wire ways or with wire ties where wire ways are not practical.
    - a. Where wire ties are used, the wire bundles are to be held at the back panel with a screw-mounted wire tie mounting base.
    - b. Bases with a self-sticking back will not be allowed.
  - 2. All plug-in contacts shall be gold-plated.
  - 3. Provide terminal boards for all field wiring and inter-unit connections, including analog signals.
    - a. Provide terminals for shield continuity where required.
  - 4. Terminal blocks shall be complete with marking strip, covers and pressure connectors.
    - a. Non-brittle, interlocking, track-mounted type.
    - b. Screw terminals will not be allowed.
    - c. A terminal for each conductor of external circuits plus one (1) ground for each shielded cable.
    - d. For free-standing panels, 8 IN of clearance shall be provided between terminals and the panel base for conduit and wiring space.
    - e. Not less than 25 percent spare terminals shall be provided.
    - f. Terminals shall be labeled to agree with identification indicated on the suppliers submittal drawings.
    - g. Individually fuse each control loop or system and all fuses or circuit breakers shall be clearly labeled and located for easy maintenance.
  - 5. All grounding wires shall be attached to the enclosure sheet metal with a ring tongue terminal.
    - a. The surface of the sheet metal shall be prepared to assure good conductivity and corrosion protection.
  - 6. Wiring shall not be kinked or spliced and shall have markings on both ends or be color coded.
    - a. Markings or color code shall match the manufacturer's drawings.
  - 7. With the exception of electronic circuits, all interconnecting wiring and wiring to terminals for external connection shall be stranded copper, type MTW or SIS, insulated for not less than 600 V, with a moisture-resistant and flame-retardant covering rated for not less than 90 DegC.
- C. Nameplates:
  - 1. All devices mounted on the face of the drive shall be provided with a suitable nameplate.
  - 2. Push buttons, selector switches, and pilot lights shall have the device manufacturer's standard legend plate.
  - 3. Relays, terminals and special devices inside the control enclosure shall have permanent markings to match identification used on manufacturer's wiring diagrams.
- D. Painting: Enclosure, after being phosphate washed, shall be thoroughly cleaned and given at least one (1) coat of rust-inhibiting primer on all inner surfaces prior to fabrication.

## 2.8 COMPONENTS AND ACCESSORIES

- A. Reactors:
  - 1. Impedance: As required.

2. Continuous current: Not less than drive rating.
3. Current overload: 150 percent for 1 minute.
4. Insulation temperature rating: 180 DegC.
5. Copper windings.
6. Saturation current rating: 3.5 to 5 times rated current.
7. Hi-potential rating: 2500 Vac line to ground and line to line, for 1 minute.
8. Noise reduction features:
  - a. Epoxy over cast coil.
  - b. Extra dips and bakes of varnish over continuous wound coil.

## **2.9 SOURCE QUALITY CONTROL**

- A. Factory Tests:
  1. Conduct all standard tests in accordance with NEMA and ANSI standards to ensure conformance to Specification requirements.
  2. Prior to final assembly:
    - a. Inspect incoming components.
    - b. Test and inspect power devices.
    - c. Circuit cards:
      - 1) Component and functional tests:
      - 2) Burn-in chamber or temperature cycling test.
      - 3) System test after burn-in or temperature cycling.
  3. After final assembly:
    - a. Continuity and insulation test of 480 power control circuits.
    - b. Drive tests:
      - 1) Burn-in complete drive at full load for 24 HRS.
      - 2) Verify all auxiliary circuits operation.
      - 3) Monitor output variables.
    - c. Systems test:
      - 1) Provide inputs to field connections and simulate on-site operation.
      - 2) Test all auxiliary equipment.

## **2.10 MAINTENANCE MATERIALS**

- A. Provide manufacturer's recommended renewable spare parts (e.g., power and control fuses).
- B. Spare parts utilized during pre-start-up or start-up and demonstration testing shall be immediately restocked, at no cost to the Owner.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions and as indicated on the Drawings.
- B. Verify the installed motor nameplate electrical requirements do not exceed the VFD capacity.
- C. Provide services of manufacturer's representative to perform start-up services.
- D. The selection of input and output harmonic and voltage spike protection shall also be made on the available physical space.
  1. The space available on the Drawings shall not be exceeded.

### **3.2 START UP**

- A. Pre-start-up Services:
  1. Shall consist of:
    - a. Physical and electrical installation check.
    - b. Final adjustments and calibration of drive parameters.

- c. VFD operation from simulated input signals.
  2. Shall be complete when VFD(s) are fully operational.
- B. Start-up and Demonstration Services:
  1. Supervise start-up of all units including recheck of settings made during the pre-start-up tests.
    - a. Perform all work in the presence of the Owner's designated representatives.
  2. Setup all VFDs with carrier frequency at minimum value consistent with proper operation; inform Engineer of carrier frequencies set in excess of 5 kHz and reason for setting.
  3. Simulate operation of the VFD and its associated control and instrumentation system in both the manual and automatic modes.
    - a. Ensure compatibility of VFD with associated control and instrumentation signals.
  4. Simulate VFD failures and demonstrate troubleshooting aids.
- C. Instruct Owner's designated personnel:
  1. Minimum of 8 HRS at the jobsite.
  2. Include both field and classroom instruction.
  3. Instructions shall include proper operation and maintenance procedures including, but not limited to:
    - a. Lubrication.
    - b. Troubleshooting.
    - c. Repair and replacement.
    - d. Parts inventory.
    - e. Maintenance records.

**END OF SECTION**

## **SECTION 16410**

### **SAFETY SWITCHES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Safety switches.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16490 - Overcurrent and Short Circuit Protective Devices.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
  - 2. Underwriters Laboratories, Inc. (UL):
    - a. 98, Enclosed and Dead-Front Switches.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. Provide a table that associates safety switch model number with connected equipment tag number.
    - c. See Specification Section 16010 for additional requirements.
- B. Operation and Maintenance Manuals:
  - 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operation and Maintenance Manuals.

#### **PART 2 - PRODUCTS**

##### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following safety switch manufacturers are acceptable:
  - 1. Cutler-Hammer.
  - 2. Square D Company.
  - 3. Siemens.

## 2.2 SAFETY SWITCHES

- A. General:
  - 1. Non-fusible or fusible as indicated on the Drawings.
  - 2. Suitable for service entrance when required.
  - 3. NEMA Type HD heavy-duty construction.
  - 4. Switch blades will be fully visible in the OFF position with the enclosure door open.
  - 5. Quick-make/quick-break operating mechanism.
  - 6. Deionizing arc chutes.
  - 7. Manufacture double-break rotary action shaft and switchblade as one (1) common component.
  - 8. Clear line shields to prevent accidental contact with line terminals.
  - 9. Operating handle (except NEMA 7 and NEMA 9 rated enclosures):
    - a. Red and easily recognizable.
    - b. Padlockable in the OFF position
    - c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.
- B. Ratings:
  - 1. Horsepower rated of connected motor.
  - 2. Voltage and amperage: As indicated on the Drawings.
  - 3. Short circuit withstand:
    - a. Non-fused: 10,000A.
    - b. Fused: 200,000A.
- C. Accessories, when indicated in PART 3 of this Specification Section or on the Drawings:
  - 1. Neutral kits.
  - 2. Ground lug kits.
  - 3. Auxiliary contact kits with 1 N.O. and 1 N.C. contact.
- D. Enclosures:
  - 1. NEMA 1 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. With or without knockouts, hinged and lockable door.
  - 2. NEMA 3R rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. With or without knockouts, hinged and lockable door.
  - 3. NEMA 4 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. No knockouts, external mounting flanges, hinged, gasketed and lockable door.
  - 4. NEMA 4X rated (metallic):
    - a. Body and cover: Type 304 or 316 stainless steel.
    - b. No knockouts, external mounting flanges, hinged and gasketed door.
  - 5. NEMA 12 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. No knockouts, external mounting flanges, hinged and gasketed door.
- E. Overcurrent and short circuit protective devices:
  - 1. Fuses.
  - 2. See Specification Section 16490 for overcurrent and short circuit protective device requirements.
- F. Standards: NEMA KS 1, UL 98.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install as indicated and in accordance with manufacturer's instructions and recommendations.
- B. Install switches adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.
- C. Provide auxiliary contact kit on local safety switches for motors being controlled by a variable frequency drive.
  - 1. The VFD is to be disabled with the switch is in the open position.
- D. Permitted uses of NEMA 1 enclosure:
  - 1. Surface or flush mounted in areas designated dry in architecturally finished areas.
- E. Permitted uses of NEMA 3R enclosure:
  - 1. Surface mounted in exterior location for HVAC equipment only.
- F. Permitted uses of NEMA 4 enclosure:
  - 1. Surface mounted in areas designated as wet.
- G. Permitted uses of NEMA 4X metallic enclosure:
  - 1. Surface mounted in areas designated as wet and/or corrosive.
- H. Permitted uses of NEMA 12 enclosure:
  - 1. Surface mounted in areas designated as dry in non-architecturally finished areas.

**END OF SECTION**

## **SECTION 16441 PANELBOARDS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Lighting and appliance panelboards.
  - 2. Power distribution panelboards.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16490 - Overcurrent and Short Circuit Protective Devices.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. PB 1, Panelboards.
  - 2. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
    - b. 67, Standard for Panelboards.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data.
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 16010 for additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Panelboard layout with alphanumeric designation, branch circuit breakers size and type, as indicated in the panelboard schedules.
- B. Operation and Maintenance Manuals:
  - 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operations and Maintenance Manuals.
  - 2. Panelboard schedules with as-built conditions.

### **PART 2 - PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Cutler-Hammer.

2. Square D Company.
3. Siemens.

## 2.2 MANUFACTURED UNITS

- A. Standards: NEMA PB 1, NFPA 70, UL 50, UL 67.
- B. Ratings:
  1. Current, voltage, number of phases, number of wires as indicated on the Drawings.
  2. Panelboards rated 240 Vac or less: As indicated in the schedule.
- C. Construction:
  1. Interiors factory assembled and designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
  2. Multi-section panelboards: Feed-through or sub-feed lugs.
  3. Main lugs: Solderless type approved for copper and aluminum wire.
- D. Bus Bars:
  1. Main bus bars:
    - a. Plated aluminum or copper sized to limit temperature rise to a maximum of 65 DegC above an ambient of 40 DegC.
    - b. Drilled and tapped and arranged for sequence phasing of the branch circuit devices.
  2. Ground bus and isolated ground bus, when indicated on the Drawings: Solderless mechanical type connectors.
  3. Neutral bus bars: Insulated 100 percent rated or 200 percent rated, when indicated on the Drawings and with solderless mechanical type connectors.
- E. Enclosure:
  1. Boxes: Code gage galvanized steel, furnish without knockouts.
  2. Trim assembly: Code gage steel finished with rust inhibited primer and manufacturers standard paint inside and out.
  3. Lighting and appliance panelboard:
    - a. Trims supplied with hinged door over all circuit breaker handles.
    - b. Trims for surface mounted panelboards, same size as box.
    - c. Trims for flush mounted panelboards, overlap the box by 3/4 IN on all sides.
    - d. Doors lockable with corrosion resistant chrome-plated combination lock and catch, all locks keyed alike.
    - e. Nominal 20 IN wide and 5-3/4 IN deep with gutter space in accordance with NFPA 70.
    - f. Clear plastic cover for directory card mounted on the inside of each door.
  4. Power Distribution Panelboards for Valve Actuators:
    - a. Panelboards located in the pipe gallery shall be NEMA 4Xstainless steel enclosures.
- F. Overcurrent and Short Circuit Protective Devices:
  1. Main overcurrent protective device:
    - a. Molded case circuit breaker.
  2. Branch overcurrent protective devices:
    - a. Mounted molded case circuit breaker.
  3. See Section 16490 for overcurrent and short circuit protective device requirements.
  4. Factory installed.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install as indicated on the Drawings, in accordance with the NFPA 70, and in accordance with manufacturer's instructions.
- B. Support panelboard enclosures from wall studs or modular channels support structure, per Specification Section 16010.



- C. Provide NEMA 4X rated enclosures as indicated on the Drawings.
- D. Provide each panelboard with a typed directory:
  - 1. Identify all circuit locations in each panelboard with the load type and location served.
  - 2. Mechanical equipment shall be identified by Owner-furnished designation if different than designation indicated on the Drawings.
  - 3. Room names and numbers shall be final building room names and numbers as identified by the Owner if different than designation indicated on the Drawings.

**END OF SECTION**

**SECTION 16442**  
**MOTOR CONTROL EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Motor control centers.
  - 2. Separately mounted motor starters (including those supplied with equipment).
  - 3. Manual motor starters.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16080 - Acceptance Testing.
  - 5. Section 16265 - Variable Frequency Drives - Low Voltage.
  - 6. Section 16490 - Overcurrent and Short Circuit Protective Devices.
  - 7. Section 16491 - Low Voltage Surge Protective Devices (SPD).
  - 8. Section 16493 - Control Equipment Accessories.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. International Electrotechnical Commission (IEC).
  - 2. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volt Maximum).
    - b. ICS 2, Controllers, Contactors and Overload Relays Rated 600 V.
    - c. ICS 3, Medium-Voltage Controllers Rated 2001 to 7200 V AC.
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 508, Standard for Industrial Control Equipment.
    - b. 845, Motor Control Centers.
- B. Miscellaneous:
  - 1. Verify motor horsepower loads, other equipment loads, and controls from approved shop drawings and notify Engineer of any discrepancies.
  - 2. Verify the required instrumentation and control wiring for a complete system and notify Engineer of any discrepancies.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 16010 for additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Motor control center:
      - 1) Elevation drawing with overall dimensions.
      - 2) Starter and component schedule.
      - 3) Identification of units and their location in the MCC.
      - 4) Nameplate schedule.
      - 5) Assembly ratings (amps, volts, short circuit, etc.).

- 6) Unit ladder logic wiring for each unit depicting electrical interlocking and wiring between units (NEMA ICS 3 Class II) and identification of terminals where field devices or remote control signals are to be terminated (NEMA ICS 3 Class II-S) as indicated on the Drawings and/or loop descriptions.
- b. Separately mounted combination starters:
  - 1) Unit ladder logic wiring for each unit depicting electrical wiring and identification of terminals where field devices or remote control signals are to be terminated as indicated on the Drawings and/or loop descriptions.
- B. Operation and Maintenance Manuals:
  - 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operation and Maintenance Manuals.
    - c. Fabrication and/or layout drawings updated with as-built conditions.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Square D Company.

### **2.2 MOTOR CONTROL CENTER**

- A. Motor control center is an existing 208 volt, 3-phase, Square D Model 5 motor control center to be modified as shown on the drawings.
- B. Construction:
  - 1. Standards: UL 845.
  - 2. Unit doors:
    - a. Formed round corners and rolled edges.
    - b. Minimum of two (2) heavy-duty hinges or continuous piano hinge.
    - c. Held closed by means of captive fasteners.
    - d. Fabricate to be a part of the structure and not part of the starter.
  - 3. Unit cubicles:
    - a. Draw-out type for motor starters through NEMA Size 5.
    - b. Guide rails for supporting and aligning starters.
    - c. Operating handle:
      - 1) With the unit stabs engaged and door closed the handle mechanism allows complete ON/OFF control of the unit disconnect and clear indication of the disconnect status.
      - 2) Circuit breaker and MCP operators includes a separate TRIPPED position.
      - 3) Mechanical interlock to prevent the opening of the door when the disconnect is in the ON position with a defeater mechanism.
      - 4) Mechanical interlock to prevent the placement of the disconnect in the ON position with the door open with a defeater mechanism.
      - 5) Non-defeatable interlock to prevent the installation or removal of a unit unless the disconnect is in the OFF position.
      - 6) Padlockable in the OFF position.
  - d. Control panel:
    - 1) Provide control devices (selector switch, indicating devices, etc.) as indicated on the Drawings per Specification Section 16493.
  - e. Control power:
    - 1) Control power transformer:
      - a) 120 V secondary.
      - b) Fused on primary and secondary side.

- c) Sized for 140 percent of required load.
    - f. Minimum of one (1) full size space unit (12 IN) for any combination magnetic motor starter or starter without overload relay.
    - g. One-half full size space unit (6 IN) for circuit breakers 100 A and less.
    - h. Effectively baffled to isolate any ionized gases which may occur within unit starter.
  - 4. Externally mounted overload relay pushbutton.
  - 5. Assemblies effectively ventilated to allow relocation of starters and other components:
    - a. Within the assembly and with the same load.
    - b. Without having to compensate for changes in location.
  - 6. Finish: Rust inhibited primer and manufacturer's standard paint inside and out.
  - 7. Wiring: NEMA ICS 3 Class II, Type B-D.
- C. Overcurrent and Short Circuit Protective Devices:
  - 1. Main device:
    - a. Molded case circuit breaker.
    - b. Fusible switch.
  - 2. Feeder devices:
    - a. Molded case circuit breaker.
    - b. Fusible switch.
  - 3. Motor protection with full voltage starters:
    - a. Motor circuit protector.
    - b. Molded case circuit breaker.
    - c. Class RK-1 fuse.
  - 4. Motor protection with reduced voltage starters:
    - a. Molded case circuit breaker.
    - b. Motor circuit protector.
    - c. Class RK-1 fuse.
  - 5. See Specification Section 16490 for overcurrent and short circuit protective device requirements.
  - 6. Factory installed.
- D. Motor Starters: See requirements within this Specification Section.

## 2.3 MOTOR STARTERS

- A. Standards:
  - 1. NEMA ICS 2.
  - 2. UL 508.
- B. Full Voltage Non-Reversing (FVNR) Magnetic Starters:
  - 1. NEMA full size rated contactor.
    - a. NEMA half sizes and IEC contactors are not permitted.
  - 2. Double-break silver alloy contacts.
  - 3. Overload relays:
    - a. Ambient insensitive, adjustable solid state type with phase loss protection, phase imbalance protection and manual reset.
  - 4. Interlock and auxiliary contacts, wired to terminal blocks:
    - a. Holding circuit contact, normally open.
    - b. Overload alarm contact, normally open.
    - c. Normally open auxiliary contact, for remote run status.
    - d. Additional field replaceable auxiliary contacts as required per the Sequence of Operation.
    - e. Two (2) additional normally open spare field replaceable auxiliary contacts.
- C. Variable Frequency Drives: See Specification Section 16265.

## 2.4 MANUAL MOTOR STARTERS

- A. Standards:

1. NEMA 250, NEMA ICS 2.
  2. UL 508.
- B. Quick-make, quick-break toggle mechanism that is lockable in the OFF position.
- C. Types:
1. Horsepower rated, for ON/OFF control.
  2. Horsepower rated, for ON/OFF control and thermal overload protection.
    - a. Switch to clearly indicate ON, OFF, and TRIPPED position.
- D. Voltage and current ratings and number of poles as required for the connected motor.
- E. Enclosures:
1. NEMA 1 rated:
    - a. Galvanized steel or steel finished with rust inhibiting primer and manufacturer's standard paint inside and out.
    - b. With or without concentric knockouts.
  2. NEMA 4 rated:
    - a. Sheet steel finished with rust inhibiting primer and manufacturer's standard paint inside and out or cast gray iron alloy or copper-free aluminum with manufacturer's standard finish.
    - b. No knockouts, external mounting flanges.
  3. NEMA 4X rated:
    - a. Type 304 or 316 stainless steel.
    - b. No knockouts, external mounting flanges.
  4. NEMA 7 and NEMA 9 rated:
    - a. Cast gray iron alloy or copper-free aluminum with manufacturer's standard finish.
    - b. Drilled and tapped openings or tapered threaded hub, external mounting flanges.
    - c. Accessories: 40 mil PVC exterior coating.
  5. NEMA 12 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturer's standard paint inside and out.
    - b. No knockouts, external mounting flanges.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install as indicated on the Drawings and in accordance with manufacturer's recommendations and instructions.
- B. Mounting height for surface mounted equipment: See Specification Section 16010.
- C. Overload Heaters:
1. Size for actual motor full load current of the connected motor.
  2. For motors with power factor correction capacitors, size to compensate for the capacitors effect on load current.
- D. Combination and Manual Starter Enclosures:
1. Permitted uses of NEMA 1 enclosure:
    - a. Surface or flush mounted in architecturally finished areas.
    - b. Surface mounted above 10 FT in areas designated as dry in architecturally and non-architecturally finished areas.
  2. Permitted uses of NEMA 4 enclosure:
    - a. Surface mounted in areas designated as wet.
  3. Permitted uses of NEMA 4X enclosure:
    - a. Surface mounted in areas designated as wet and/or corrosive.

### **3.2 FIELD QUALITY CONTROL**

A. Acceptance Testing: See Specification Section 16080.

**END OF SECTION**

**SECTION 16490**  
**OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Low voltage circuit breakers.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16080 - Acceptance Testing.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C37.13, Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures.
    - b. C37.16, Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors - Preferred Ratings, Related Requirements, and Application Recommendations.
    - c. C37.17, Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers.
  - 2. National Electrical Manufacturers Association (NEMA):
    - a. AB 1, Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures. (Equivalent to UL 489)
  - 3. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 4. Underwriters Laboratories, Inc. (UL):
    - a. 489, Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
    - b. 943, Standard for Safety for Ground-Fault Circuit-Interrupters.
    - c. 1066, Standard for Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 16010 for additional requirements.
- B. Operation and Maintenance Manual:
  - 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operation and Maintenance Manuals.
- C. Miscellaneous Submittals:
  - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Reports:

- a. As-left condition of all circuit breakers that have adjustable settings.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Circuit breakers:
    - a. Cutler-Hammer.
    - b. Square D Company.
    - c. Siemens.

### **2.2 CIRCUIT BREAKERS**

- A. Molded Case Type:
  - 1. General:
    - a. Standards: NEMA AB 1, UL 489.
    - b. Unit construction.
    - c. Over-center, toggle handle operated.
    - d. Quick-make, quick-break, independent of toggle handle operation.
    - e. Manual and automatic operation.
    - f. All poles open and close simultaneously.
    - g. Three (3) position handle: On, off and tripped.
    - h. Molded-in ON and OFF markings on breaker cover.
    - i. One-, two- or three-pole as indicated on the Drawings.
    - j. Current and interrupting ratings as indicated on the Drawings.
    - k. Bolt on type.
  - 2. Thermal magnetic type:
    - a. Inverse time overload and instantaneous short circuit protection by means of a thermal magnetic element.
    - b. Frame size 150 amp and below:
      - 1) Non-interchangeable, non-adjustable thermal magnetic trip units.
    - c. Frame sizes 225 to 400 amp (trip settings less than 400A):
      - 1) Interchangeable and adjustable instantaneous thermal magnetic trip units.
    - d. Ground Fault Circuit Interrupter (GFCI) Listed:
      - 1) Standard: UL 943.
      - 2) One- or two-pole as indicated on the Drawings.
      - 3) Class A ground fault circuit.
      - 4) Trip on 5 mA ground fault (4-6 mA range).
  - 3. Solid state trip type:
    - a. Inverse time overload, instantaneous short circuit and ground fault protection by means of a solid state trip element, associated current monitors and flux shunt trip mechanism.
    - b. Frame size 400 amp to 1200 amp (trip settings between 400 and 1200A):
      - 1) Standard rating.
      - 2) Interchangeable current sensor or rating plug.
      - 3) Adjustable long time pick-up setting.
        - a) Adjustable from 50 to 100 percent of the current sensor or rating plug.
      - 4) Adjustable short time pick-up setting.
      - 5) Adjustable instantaneous pick-up.
      - 6) Fixed ground fault pick-up, when indicated on the Drawings.
    - c. Frame size 1600 amp and above:
      - 1) 100 percent rated.
      - 2) Interchangeable current sensor or rating plug.
      - 3) Adjustable long time pick-up setting.
        - a) Adjustable from 50 to 100 percent of the current sensor or rating plug.



- 4) Adjustable long time delay setting.
  - 5) Adjustable short time pick-up setting.
  - 6) Adjustable instantaneous pick-up setting.
  - 7) Adjustable ground fault pick-up setting, when indicated on the Drawings.
  - 8) Adjustable ground fault delay setting, when indicated on the Drawings.
4. Motor circuit protector:
    - a. Adjustable instantaneous short circuit protection by means of a magnetic or solid state trip element.
    - b. Sized for the connected motor.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Current and interrupting ratings as indicated on the Drawings.
- B. Series rated systems not acceptable.
- C. Devices shall be ambient temperature compensated.
- D. Circuit Breakers:
  1. Molded case circuit breakers shall incorporate the following, unless indicated otherwise on the Drawings:
    - a. Frame sizes 400 amp and less with trip setting less than 400A shall be thermal magnetic type.
    - b. Frame sizes 450 amp and larger shall be solid state trip type.
    - c. Frame sizes 1000 amp and above shall include integral ground fault protection, when indicated on the Drawings.
    - d. Motor circuit protectors sized for the connected motor.
  2. Insulated case circuit breakers shall incorporate the following, unless indicated otherwise on the Drawings:
    - a. Set current sensor or rating plugs long time pick-up setting so that the indicated trip level is near the 75 percent trip point.
    - b. Frame sizes 1000 amp and above shall include integral ground fault protection, when indicated on the Drawings.

### **3.2 FIELD QUALITY CONTROL**

- A. Adjustable Circuit Breakers:
  1. Set all circuit breaker adjustable taps as defined on the Drawings, except adjust motor circuit protectors per the motor nameplate and NFPA 70 requirements.
- B. Ground Fault Protection System:
  1. Single source system:
    - a. Main breaker using the residual sensing method system coordinated with individual feeder breakers using the residual sensing method.
    - b. Main and feeder breakers: Utilize four (4) individual current sensors; the phase sensors are integral to the circuit breaker and the neutral sensor is external to the circuit breaker.
- C. Testing:
  1. Acceptance testing: See Specification Section 16080.

## **END OF SECTION**

**SECTION 16491**  
**LOW VOLTAGE SURGE PROTECTION DEVICES (SPD)**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Type 1 SPD - High exposure locations (switchboard, or panelboard), integrally mounted.
  - 2. Type 2 SPD - High exposure locations (switchboard, or panelboard), externally mounted.
  - 3. Type 3 SPD - Medium exposure locations (switchboard, panelboard and motor control center), integrally mounted.
  - 4. Type 4 SPD - Medium exposure location (switchboard and panelboard), externally mounted.
  - 5. Type 5 SPD - Medium or low exposure locations at individual equipment locations, external, parallel connection.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
    - b. C62.41.1, Guide on the Surge Environment in Low-Voltage (1000V and Less) AC Power Circuits.
    - c. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
    - d. C62.45, Recommended Practice on Surge Testing For Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.
  - 2. Military Standard:
    - a. MIL-STD-220B, Method of Insertion-Loss Measurement.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. LS 1, Low Voltage Surge Protective Devices.
  - 4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 5. Underwriters Laboratories, Inc. (UL):
    - a. 1283, Standard for Electromagnetic Interference Filters.
    - b. 1449, Standard for Safety Transient Voltage Surge Suppressors.
- B. Qualifications:
  - 1. Provide devices from a manufacturer who has been regularly engaged in the development, design, testing, listing and manufacturing of SPDs of the types and ratings required for a period of 10 years or more and whose products have been in satisfactory use in similar service.
    - a. Upon request, suppliers or manufacturers shall provide a list of not less than three (3) customer references showing satisfactory operation.

### 1.3 DEFINITIONS

- A. Clamping Voltage:
  - 1. The applied surge shall be induced at the 90 degree phase angle of the applied system frequency voltage.
  - 2. The voltage measured at the end of the 6 IN output leads of the SPD and from the zero voltage reference to the peak of the surge.
- B. Let-Through Voltage:
  - 1. The applied surge shall be induced at the 90 degree phase angle of the applied system frequency voltage.
  - 2. The voltage measured at the end of the 6 IN output leads of the SPD and from the system peak voltage to the peak of the surge.
- C. Maximum Continuous Operating Voltage (MCOV): The maximum steady state voltage at which the SPD device can operate and meet its specification within its rated temperature.
- D. Maximum Surge Current:
  - 1. The maximum 8 x 20 microsecond surge current pulse the SPD device is capable of surviving on a single-impulse basis without suffering either performance degradation or more than 10 percent deviation of clamping voltage at a specified surge current.
  - 2. Listed by mode, since number and type of components in any SPD may vary by mode.
- E. MCC: Motor Control Center.
- F. Protection Modes: This parameter identifies the modes for which the SPD has directly connected protection elements, i.e., line-to-neutral (L-N), line-to-line (L-L), line-to-ground (L-G), neutral-to-ground (N-G).
- G. Surge Current per Phase:
  - 1. The per phase rating is the total surge current capacity connected to a given phase conductor.
    - a. For example, a wye system surge current per phase would equal L-N plus L-G; a delta system surge current per phase would equal L-L plus L-G.
    - b. The N-G mode is not included in the per phase calculation.
- H. System Peak Voltage: The electrical equipment supply voltage sine wave peak (i.e., for a 480/277 V system the L-L peak voltage is 679V and the L-N peak voltage is 392 V).

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Manufacturer's qualifications.
    - b. Standard catalog cut sheet.
    - c. Electrical and mechanical drawing showing unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.
    - d. Testing procedures and testing equipment data.
    - e. Create a Product Data Sheet for each different model number of SPD provided (i.e., Model XYZ with disconnect and Model XYZ without disconnect, each require a Product Data Sheet).
      - 1) Data in the Product Data Sheet heading:
        - a) SPD Type Number per PART 2 of the Specification.
        - b) Manufacturer's Name.
        - c) Product model number.
      - 2) Data in the Product Data Sheet body:
        - a) Column one: Specified value/feature of every paragraph of PART 2 of the Specification.

- b) Column two: Manufacturer's certified value confirming the product meets the specified value/feature.
    - c) Name of the nationally recognized testing laboratory that performed the tests.
    - d) Warranty information.
  - 3) Data in the Product Data Sheet closing:
    - a) Signature of the manufacturer's official (printed and signed).
    - b) Title of the official.
  - 4) Date of signature.
- B. Operation and Maintenance Manual:
  - 1. See Section 01730 for requirements for:
    - a. The mechanics and administration of submittal process.
    - b. The content of the Operation and Maintenance Manuals.
  - 2. Warranty.

## 1.5 WARRANTY

- A. Minimum of a five (5) year Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Standards: IEEE C62.41.1, IEEE C62.41.2, IEEE C62.45, NEMA LS 1, MIL-STD 220B, UL 1283, UL 1449.

### 2.2 TYPE 1 SPD

- A. Product:
  - 1. Externally mounted next to panelboards.
  - 2. Hybrid solid-state high performance suppression system.
    - a. Do not use suppression system with gas tubes, spark gaps or other components which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
  - 3. Do not connect multiple SPD modules in series to achieve the specified performance.
  - 4. Designed for parallel connection.
  - 5. Enclosure:
    - a. Metallic NEMA 4 or 12 for interior locations.
    - b. Metallic NEMA 4 or 4X for exterior locations.
  - 6. Field connection:
    - a. Mechanical or compression lugs for each phase, neutral and ground that will accept #10 through #1/0 conductors. OR
    - b. Preinstalled lead conductors: Size per manufacturer, length as required with a maximum of 5 FT.
  - 7. Device monitor:
    - a. Long-life, solid state, externally visible indicators and Form C dry contact(s) that monitor the on-line status of each mode of the units suppression filter system or power loss in any of the phase.
    - b. A fuse status only monitor system is not acceptable.
  - 8. Accessories (when specifically specified): Unit mounted disconnect switch.
- B. Operating Voltage: Nominal unit operating voltage and configuration as indicated on the Drawings.
- C. Modes of Protection: All modes.
  - 1. Three phase (delta): L-L, L-G.

2. Three phase (wye): L-N, L-L, L-G and N-G.
  3. Single phase (2 pole): L-L, L-N, L-G and N-G.
  4. Single phase: L-N, L-G and N-G.
- D. Maximum Continuous Operating Voltage: Less than 130 percent of system peak voltage.
- E. Operating Frequency: 45 to 65 Hz.
- F. Short Circuit Rating: Equal to or greater than rating of equipment SPD is connected to.
- G. Maximum Surge Current: 240,000 A per phase, 120,000 A per mode minimum.
- H. Minimum Repetitive Surge Current Capacity: 4000 IEEE C High waveform impulses with no degradation of more than 10 percent deviation of the clamping voltage.
- I. SPD Protection:
1. Integral unit level and/or component level overcurrent fuses and sustained overvoltage thermal cutout device.
  2. An IEEE C High waveforms shall not cause the fuse to open and render the SPD inoperable.
- J. Maximum Clamping Voltages: Dynamic test at the 90 degree phase angle including 6 IN lead length and measured from the zero voltage reference:

<b>IEEE C62.41</b>				
<b>System Voltage</b>	<b>Test Mode</b>	<b>C High V &amp; I Wave</b>	<b>B Combination Wave</b>	<b>UL 1449</b>
<b>L-L &lt; 250 V</b>	L-L	1470 V	1000 V	800 V
	<b>L-N &lt; 150 V</b>	L-N	850 V	600 V
		L-G	1150 V	800 V
		N-G	1150 V	800 V
<b>L-L &gt; 250 V</b>	L-L	2700 V	2000 V	1800 V
	<b>L-N &gt; 150 V</b>	L-N	1500 V	1150 V
		L-G	2000 V	1550 V
		N-G	2000 V	1550 V

- K. EMI-RFI Noise Rejection: Attenuation greater than 30 dB for frequencies between 100 kHz and 100 MHz.

### 2.3 TYPE 2 SPD

- A. Product:
1. Integrally mounted in a panelboard.
  2. Hybrid solid state high performance suppression system.
    - a. Do not use gas tubes, spark gaps or other components in suppression system which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
  3. Do not connect multiple SPD modules in series to achieve the specified performance.
  4. Designed for parallel connection.
  5. Field connection: Use mechanical or compression lugs for each phase, neutral and ground that will accept bus bar or #10 through #1/0 conductors.
  6. Device monitor:
    - a. Long-life, solid state, externally visible indicators and Form C contact(s) that monitor the on-line status of each mode of the units suppression filter system or power loss in any of the phases.
    - b. A fuse status only monitor system is not acceptable.
- B. Operating Voltage: The nominal unit operating voltage and configuration as indicated on the Drawings.

- C. Modes of Protection: All modes.
  - 1. Three phase (delta): L-L, L-G.
  - 2. Three phase (wye): L-N, L-L, L-G and N-G.
  - 3. Single phase (2 pole): L-L, L-N, L-G and N-G.
  - 4. Single phase: L-N, L-G and N-G.
- D. Maximum Continuous Operating Voltage: Less than 130 percent of system peak voltage.
- E. Operating Frequency: 45 to 65 Hz.
- F. Short Circuit Rating: Equal to or greater than rating of equipment SPD is connected to.
- G. Maximum Surge Current: 160,000 A per phase, 80,000 A per mode minimum.
- H. Minimum Repetitive Surge Current Capacity: 4000 IEEE C High or B combination waveform impulses with no degradation of more than 10 percent deviation of the clamping voltage.
- I. SPD Protection:
  - 1. Integral unit level and/or component level overcurrent fuses and sustained overvoltage thermal cutout device.
  - 2. An IEEE B combination wave shall not cause the fuse to open and render the SPD inoperable.
- J. Maximum Clamping Voltages: Dynamic test at the 90 degree phase angle including 6 IN lead length and measured from the zero voltage reference:

System Voltage	Test Mode	IEEE C62.41		UL 1449
		B Comb. Wave	B3 Ring Wave	
<b>L-L &lt; 250 V</b> <b>L-N &lt; 150 V</b>	L-L	1000 V	700 V	800 V
	L-N	600 V	400 V	500 V
	L-G	800 V	550 V	600 V
	N-G	800 V	550 V	600 V
<b>L-L &gt; 250 V</b> <b>L-N &gt; 150 V</b>	L-L	2000 V	1400 V	1800 V
	L-N	1150 V	800 V	1000 V
	L-G	1550 V	1000 V	1200 V
	N-G	1550 V	1000 V	1200 V

- K. EMI-RFI Noise Rejection: Attenuation greater than 30 dB for frequencies between 100 kHz and 100 MHz.

## 2.4 SOURCE QUALITY CONTROL

- A. SPD approvals and ratings shall be obtained by manufacturers from nationally recognized testing laboratories.
- B. The SPD are to be tested as a complete SPD system including:
  - 1. Integral unit level and/or component level fusing.
  - 2. Neutral and ground shall not be bonded during testing.
  - 3. 6 IN lead lengths.
  - 4. Integral disconnect switch when provided.
- C. The “as installed” SPD system including the manufacturers recommended circuit breaker, the SPD is connected to, will not open when tested with a IEEE C3 combination waveform.
- D. Tests to be performed in accordance with IEEE C62.45:
  - 1. Clamping voltage performance testing using IEEE C62.41 Category waveforms.
  - 2. Single pulse surge current capacity test.
  - 3. Repetitive surge current capacity testing.
  - 4. Spectrum analysis for EMI-RFI noise rejection.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Type 2 SPD:
  - 1. Connected in parallel to the equipment.
  - 2. Install in dedicated electrical equipment compartment, bucket or panelboard box at the factory before shipment.
  - 3. Provide leads that are as short and straight as possible.
  - 4. Maximum lead length: 12 IN.
  - 5. Minimum lead size: #2 stranded AWG or bus bar.
  - 6. Connect leads to the equipment to be protected by one (1) of the following means:
    - a. Through a circuit breaker or molded case switch mounted in the equipment.
    - b. Use manufacturer recommended circuit breaker size.
    - c. Circuit breaker or switch to be operable from the equipment exterior or from behind a hinged door.
- C. Type 1 SPD:
  - 1. Mounting options:
    - a. On wall or support structure adjacent to the equipment to be protected with leads routed through conduit. OR
    - b. Nipple connection directly to the equipment to be protected.
  - 2. Install leads as short and straight as possible.
  - 3. Maximum lead length: 5 FT.
  - 4. Minimum lead size:
    - a. Type 2 and 4 SPD: #2 stranded AWG.
    - b. Type 5: #10 stranded AWG.
  - 5. When conduit connection is used, provide a minimum of four (4) twists per foot in the lead conductors and install in NFPA 70 sized conduit.
  - 6. Connect leads to the equipment to be protected by one (1) of the following means:
    - a. Through a circuit breaker or molded case switch mounted in the equipment.
      - 1) Use manufacturer recommended circuit breaker size.
    - b. Directly to the protected equipment bus, when SPD has integral disconnect switch.
    - c. To the load side of field mounted equipment's local disconnect switch.
      - 1) Provide taps or lugs as required to provide a UL and NFPA 70 compliant connection.

**END OF SECTION**

**SECTION 16493**  
**CONTROL EQUIPMENT ACCESSORIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Operator control devices (selector switches, pushbuttons, indicator lights, etc.).
  - 2. Control devices (timers, relays, contactors, etc.).
  - 3. Control panels and operator stations.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.
  - 3. Section 16010 - Electrical: Basic Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. ICS 2, Industrial Control and System Controllers, Contactors and Overload Relays Rated 600 Volts.
  - 2. Underwriters Laboratories, Inc. (UL):
    - a. 508, Standard for Safety Industrial Control Equipment.
    - b. 508A, Standard for Safety Industrial Control Panels.
- B. Miscellaneous:
  - 1. Supplier of Industrial Control Panels shall build control panel under the provisions of UL 508A.
    - a. Entire assembly shall be affixed with a UL 508A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Section 01300 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification:
    - b. Control panel bill of material.
    - c. See Section 16010 for additional requirements.
  - 3. Fabrication and/or layout drawings.
    - a. Control panel interior and exterior layout.
    - b. Control panel wiring diagrams.
- B. Operation and Maintenance Manuals:
  - 1. See Section 01730 for requirements for:
    - a. The mechanics and administration of submittal process.
    - b. The content of Operation and Maintenance Manuals.



## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Pilot devices and relays:
    - a. Idec.
    - b. Potter & Brumfield.
    - c. Time Mark.
    - d. ATC Diversified Electronics.
  2. Contactors:
    - a. Automatic Switch Company (ASCO).
    - b. Cutler-Hammer.
    - c. Square D Company.
    - d. Siemens.
    - e. Allen Bradley.
  3. Photocells and time clocks:
    - a. Grasslin.
    - b. Tork.
    - c. Intermatic.
    - d. Paragon.
  4. Alarm devices:
    - a. Edwards Signaling.
    - b. Federal Signal Corp.
  5. Terminal blocks:
    - a. Phoenix Contact.
    - b. Allen-Bradley.
  6. Enclosures:
    - a. Hoffman Engineering Co.
    - b. Wiegmann.
    - c. B-Line Circle AW.
    - d. Adalet.

### **2.2 PILOT DEVICES**

- A. General Requirements:
1. Standards: NEMA ICS 2, UL 508.
  2. Heavy-duty NEMA 4/13 watertight/oiltight.
  3. Heavy-duty NEMA 4/4X corrosion resistant.
  4. Mounting hole: 30.5 mm.
  5. Contact blocks: 10 amp, NEMA A600 rated, number as required to fulfill functions shown or specified.
  6. Legend plate marked as indicated on Drawings or specified.
- B. Selector Switches:
1. Two, three- or four-position rotary switch as required to fulfill functions shown or specified.
  2. Maintained contact type.
  3. Knob or lever type operators.
- C. Pushbuttons:
1. Non-illuminated type:
    - a. Protective boot.
    - b. Momentary contact.
    - c. Standard flush and mushroom operators.
    - d. Black colored buttons for START or ON and black color for STOP or OFF.
    - e. Emergency stop pushbuttons: Mushroom head operator and maintained contact.

2. Illuminating type:
    - a. Protective boot.
    - b. Momentary contact.
    - c. Standard flush operator.
    - d. Serves as both pushbutton control and indicating light.
    - e. Red colored lenses for START or ON and green color for STOP or OFF.
    - f. Resistor-type full voltage light unit with lens and panel gasket.
- D. Indicating Lights:
1. Allowing replacement of bulb without removal from control panel.
  2. Lamp: LED, 120 V or 24 V as required.
  3. Full voltage type.
  4. Push-to-test indicating lights.
  5. Glass lens.
  6. Color code lights as follows:
    - a. Green: OFF or stopped; valve open.
    - b. Amber: Standby; auto mode; ready.
    - c. Red: ON or running; valve closed.

## 2.3 RELAYS

- A. General Requirements:
1. Standards: NEMA ICS 2, UL 508.
- B. Control Relays:
1. General purpose (ice cube) type:
    - a. Plug-in housing.
    - b. Clear polycarbonate dust cover with clip fastener.
    - c. Coil voltage: 120 Vac or as required.
    - d. Contacts:
      - 1) 10 amp continuous.
      - 2) Silver cadmium oxide.
      - 3) Minimum of 3 SPDT contacts.
    - e. Sockets: DIN rail mounted.
    - f. Internal neon or LED indicator is lit when coil is energized.
    - g. Manual operator switch.
  2. Industrial type:
    - a. Coil voltage: 120 Vac or as required.
    - b. Contacts:
      - 1) 10 amp, NEMA A600 rated.
      - 2) Double break, silver alloy.
      - 3) Convertible from normally open to normally closed or vice versa, without removing any wiring.
      - 4) Expandable from 2 poles to 12 poles.
    - c. Provide contacts for all required control plus two spares.
- C. Time Delay Relays:
1. General purpose type:
    - a. Timing modes: On and Off delay, interval, one shot and repeat cycle.
    - b. Plug-in housing.
    - c. Polycarbonate dust cover with clip fastener.
    - d. Coil voltage: 120 Vac or as required.
    - e. Contacts:
      - 1) 10 amp continuous.
      - 2) Silver cadmium oxide.
      - 3) Two normally open and two normally closed DPDT contacts.
    - f. Sockets: DIN rail mounted.
    - g. External timing adjustment knob.

- h. Timing ranges: 0.05 seconds to 16.65 HRS.
- i. Repeat accuracy: +1 percent.
- 2. Solid State industrial type:
  - a. Timing modes: On and Off delay and repeat cycle.
  - b. Industrial housing.
  - c. Coil voltage: 120 Vac or as required.
  - d. Contacts:
    - 1) 5 amp, NEMA B150 rated.
    - 2) Silver alloy.
    - 3) Convertible On Delay and Off Delay contacts.
    - 4) One normally open and one normally closed timed contacts.
    - 5) One normally open and one normally closed instantaneous contacts.
  - e. Furnish with "on" and "timing out" indicators.
  - f. External timing adjustment knob.
  - g. Timing ranges: 0.05 seconds to 10 HRS.
  - h. Repeat accuracy: +1 percent.
- 3. Mechanical industrial type:
  - a. Timing modes: On and Off delay.
  - b. Coil voltage: 120 Vac or as required.
  - c. Contacts:
    - 1) 10 amp, NEMA A600 rated.
    - 2) Double break, silver alloy.
    - 3) Convertible On Delay and Off Delay contacts.
    - 4) Convertible normally open and normally closed timed contacts.
    - 5) Convertible normally open instantaneous contacts.
  - d. External timing adjustment knob.
  - e. Timing ranges: 0.2 - 60 sec or 5 - 180 sec.
  - f. Repeat accuracy: Greater than +10 percent.

## 2.4 CONTACTORS

- A. General Requirements:
  - 1. Standards: NEMA ICS 2, UL 508.
- B. Lighting and Remote Control Switches:
  - 1. Electrically operated, electrically held.
  - 2. Coil voltage: 120 Vac or as required.
  - 3. Contacts: Totally enclosed, double-break silver-cadmium-oxide.
  - 4. Rated for ballasted lighting, tungsten and general use loads.
  - 5. Number of poles, continuous ampere rating and voltage, as indicated on Drawings or as specified.
  - 6. Auxiliary control relays, as indicated on Drawings or as specified.
  - 7. Auxiliary contacts, as indicated on Drawings or as specified.
- C. Definite Purpose:
  - 1. Coil voltage: 120 Vac or as required.
  - 2. Contacts: Totally enclosed, double-break silver-cadmium-oxide.
  - 3. Resistive load and horsepower rated.
  - 4. Number of poles, continuous ampere rating and voltage, as indicated on Drawings or as specified.
  - 5. Auxiliary contacts, as indicated on Drawings or as specified.

## 2.5 PHOTOCELLS AND TIME CLOCKS

- A. Photocells:
  - 1. Weatherproof enclosure.
  - 2. Adjustable turn-on range, initially set at 1.0 footcandles.
    - a. Turn-off level approximately three times turn-on.

3. Provide time delay device to eliminate nuisance switching.
  4. Voltage, amperage and/or wattage ratings as required for the application.
- B. General Requirements for Time Clocks:
1. Separate manual on-off operation without disturbing automatic settings.
  2. Enclosure:
    - a. NEMA 1 for indoor locations.
    - b. Stand alone or DIN rail for mounting in control panel.
    - c. NEMA 3R or 4 for exterior locations.
  3. Voltage, amperage and/or wattage ratings as required for the application.
- C. Electronic:
1. 24 HR and seven (7) day programmable using solid state technology.
  2. Minimum of 72 HR carryover power utilizing rechargeable battery or capacitor.
  3. Minimum of seven (7) on and seven (7) off set points.

## 2.6 ALARM DEVICES

- A. Alarm Horns:
1. Vibrating horn type.
  2. PLC compatible as required.
  3. Heavy-duty die cast housing with corrosion resistant finish.
  4. Adjustable volume: 78 to 103 dB at 10 FT.
  5. Voltage: 120 Vac or as required.
  6. Enclosures/mountings:
    - a. Flush wall or panel mounting in dry areas.
    - b. NEMA 4X panel mounting in wet areas.
    - c. Surface mounting in dry areas.
    - d. NEMA 4X surface mounting in wet areas.
    - e. NEMA 4X, hazardous location surface mounting in wet and hazardous areas.
      - 1) Fixed volume: 97 dB at 10 FT.
- B. Alarm Lights:
1. Panel mounted:
    - a. Strobe type.
    - b. Shatter resistant polycarbonate lens and base.
    - c. Lens color as indicated on Drawings.
    - d. NEMA 4X enclosure.
    - e. PLC compatible.
    - f. Voltage: 120 Vac.
  2. Wall mounted:
    - a. Heavy-duty strobe type.
    - b. Weatherproof shatter resistant polycarbonate lens and cast base.
    - c. Optically designed fresnel lens with color as indicated on Drawings.
    - d. Immune to shock and vibration, no moving parts.
    - e. Xenon flash tube providing a minimum of 65 single flashes per minute.
    - f. Mounting: Wall or corner wall brackets.

## 2.7 MISCELLANEOUS DEVICES

- A. Run Time Meters:
1. Six-digit wheels including a 1/10 digit.
  2. Non-reset type.
  3. Time range in hours.
  4. Automatic recycle at zero.
  5. Accuracy: 1 percent.
  6. Sealed against dirt and moisture.
  7. Tamperproof.

## 2.8 TERMINATION EQUIPMENT

- A. General Requirements:
  - 1. Modular type with screw compression clamp.
  - 2. Screws: Stainless steel.
  - 3. Current bar: Nickel-plated copper alloy.
  - 4. Thermoplastic insulation rated for -40 to +90 DegC.
  - 5. Wire insertion area: Funnel-shaped to guide all conductor strands into terminal.
  - 6. End sections and end stops at each end of terminal strip.
  - 7. Machine-printed terminal markers on both sides of block.
  - 8. Spacing: 6 mm.
  - 9. Wire size: 22-12 AWG.
  - 10. Rated voltage: 600 V.
  - 11. DIN rail mounting.
- B. Standard-type block:
  - 1. Rated current: 30 A.
  - 2. Color: Gray body.
- C. Bladed-type disconnect block:
  - 1. Terminal block with knife blade disconnect which connects or isolated the two sides of the block.
  - 2. Rated current: 10 A.
  - 3. Color:
    - a. Panel control voltage leaves enclosure - normal: Gray body, orange switch.
    - b. Foreign voltage entering enclosure: Orange body, orange switch.
- D. Grounded-type block:
  - 1. Electrically grounded to mounting rail.
  - 2. Terminal ground wires and analog cable shields.
  - 3. Color: Green and yellow body.
- E. Fuse Holders:
  - 1. Blocks can be ganged for multi-pole operation.
  - 2. Spacing: 9.1 mm.
  - 3. Wire size: 30-12 AWG.
  - 4. Rated voltage: 300 V.
  - 5. Rated current: 12 A.
  - 6. Fuse size: 1/4 x 1-1/4.
  - 7. Blown fuse indication.
  - 8. DIN rail mounting.

## 2.9 ENCLOSURES

- A. Control Panels:
  - 1. NEMA 4 rated:
    - a. Seams continuously welded and ground smooth.
    - b. No knockouts.
    - c. External mounting flanges.
    - d. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
    - e. Cover with oil resistant gasket.
  - 2. NEMA 4X rated:
    - a. Body and cover: 14 GA Type 304 or 316 stainless steel.
    - b. Seams continuously welded and ground smooth.
    - c. No knockouts.
    - d. External mounting flanges.
    - e. Hinged door and stainless steel screws and clamps.
    - f. Door with oil-resistant gasket.

3. NEMA 12 enclosure:
    - a. Body and cover: 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. No knockouts.
    - c. External mounting flanges.
    - d. Non-hinged stainless steel cover held closed with captivated cover screws threaded into sealed wells or hinged cover held closed with stainless steel screws and clamps.
    - e. Flat door with oil resistant gasket.
  4. Control panel miscellaneous accessories:
    - a. Back plane mounting panels: Steel with white enamel finish or Type 304 stainless steel.
    - b. Interiors shall be white or light gray in color.
    - c. Wire management duct:
      - 1) Bodies: PVC with side holes.
      - 2) Cover: PVC snap-on.
      - 3) Size as required.
    - d. Rigid handles for covers larger than 9 SF or heavier than 25 LBS.
    - e. Split covers when heavier than 25 LBS.
    - f. Floor stand kits made of same material as the enclosure.
    - g. Weldnuts for mounting optional panels and terminal kits.
    - h. Ground bonding jumper from door, across hinge, to enclosure body.
  5. Standards: NEMA 250, UL 508.
- B. Operator Control Stations:
1. NEMA 4/13 rated:
    - a. Die cast aluminum body with manufacturers standard finish.
    - b. Gasketed die cast aluminum cover with manufacturers standard finish.
    - c. Number of device mounting holes as required.
  2. NEMA 4X rated:
    - a. Type 304 or 316 stainless steel body.
    - b. Gasketed Type 304 or 316 stainless steel cover.
    - c. Number of device mounting holes as required.

## **2.10 MAINTENANCE MATERIALS**

- A. Provide 100 percent replacement lamps for indicating lights.
- B. Provide 10 percent replacement caps for indicating lights.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install as indicated and in accordance with manufacturer's recommendations and instructions.
- B. Control Panels:
  1. Size as required to mount the equipment.
  2. Permitted uses of NEMA 4 enclosure:
    - a. Surface mounted in areas designated as wet.
  3. Permitted uses of NEMA 4X enclosure:
    - a. Surface mounted in areas designated as wet and/or corrosive or highly corrosive.
  4. Permitted uses of NEMA 12 enclosure:
    - a. Surface mounted in areas designated as dry and/or dusty architecturally or non-architecturally finished areas.

- C. Operator Control Stations:
  - 1. Permitted uses of NEMA 4/13 enclosure:
    - a. Surface mounted in areas designated as dry and/or dusty architecturally or non-architecturally finished areas and wet.
  - 2. Permitted uses of NEMA 4X enclosure:
    - a. Surface mounted in areas designated as wet and/or corrosive or highly corrosive.

**3.2 FIELD QUALITY CONTROL**

- A. See Section 16010.

**END OF SECTION**

**SECTION 16500**  
**EXTERIOR LIGHTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Exterior building and site lighting fixtures.
    - b. Lamps.
    - c. Lighting poles.
    - d. Lighting control.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 1 - General Requirements.
  - 2. Division 3 – Concrete.
  - 3. Section 16010 - Electrical: Basic Requirements.
  - 4. Section 16120 - Wire and Cable - 600 Volt and Below.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Federal Communications Commission (FCC):
    - a. Rules and Regulations, Part 18:
      - 1) Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
  - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000Volts Maximum).
  - 4. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
    - a. C78.377-2008, Specifications for the Chromaticity of solid state lighting products.
  - 5. American National Standards Institute/ Underwriters Laboratories, Inc. (ANSI/UL):
    - a. 8750-2009, Standard for light emitting diode (LED) equipment for use in lighting products.
  - 6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
    - b. 101, Life Safety Code.
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 248-4, Low-Voltage Fuses - Part 4: Class CC Fuses.
    - b. 1598, Standard for Safety for Luminaires.
  - 8. United States Department of Energy (USDOE):
    - a. EAct, the National Energy Policy Act.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Section 01340 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification:
    - b. Identify fixtures by Fixture Schedule number.
    - c. Fixture data sheet including:



- 1) Photometric performance data including candlepower distribution and coefficient of utilization (CU) table.
- 2) Fixture effective projected areas for pole mounted fixtures.
- d. Pole data shall include:
  - 1) Pole wind loading.
  - 2) Anchor bolt template.
- e. UL nameplate data for fixtures used in Class 1 Division 1 and 2 areas.
- f. See Section 16010 for additional requirements.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Lighting fixtures: See Fixture Schedule on Electrical Legend Sheet.
  2. Lamps:
    - a. Osram/Sylvania.
    - b. General Electric.
    - c. Philips.
  3. Poles: Fixture manufacturer's standard.

### **2.2 GENERAL REQUIREMENTS**

- A. All lighting fixtures and electrical components:
1. UL labeled.
  2. Fixtures complete.
- B. No live parts normally exposed to contact.
- C. When intended for use in wet areas: Mark fixtures "Suitable for wet locations."
- D. When intended for use in damp areas: Mark fixtures "Suitable for damp locations" or "Suitable for wet locations."

### **2.3 LIGHT FIXTURES**

- A. Incandescent: No incandescent fixtures required for this project.
- B. LED Luminaire:
1. UL 844 listed.
  2. Key components including LED drivers, LED light sources, and surge protection devices shall be RoHS compliant.
  3. The luminaire shall be in compliance with Electro Magnetic Interference (EMI) requirements as defined by FCC 47 Sub Part 15; CISPR15, CISPR22 Class A (120Vmin), EN61000-3-2, -3-3, -4-4, -4-5.
  4. The luminaire shall have a passive cooling method employed to manage thermal output of LED light engine and power supply.
  5. The luminaire shall have a label per ANSI C136.22 stating operating voltage and current range. The label must be clearly visible on the inside of the housing.
  6. The luminaire shall have an integral power supply (electronic driver).
  7. The luminaire shall have a power supply (electronic driver) that will operate on an autosensing 120-277 or 347-480 volt single phase at 60 hertz.
  8. The luminaire shall have a power supply (electronic driver) that has a power factor of .90 or greater at full load.
  9. The luminaire shall have a power supply (electronic driver) that has total harmonic distortion of 20% or less at full load.
  10. The luminaire shall have power supply (electronic driver) output ripple of less than 10%.

11. The luminaire shall have an isolated power supply (electronic driver) output.
12. The luminaire shall have a power supply (electronic driver) that has thermal overload protection.
13. The luminaire shall have a power supply (electronic driver) that is self-limited short circuit protected and over load protected.
14. The luminaire shall not use any active thermal cutback, such as in order to achieve a higher thermal performance.
15. LED drivers shall utilize a dimming type driver, suitable for accepting 0 - 10 V DC control signal from the dimming control panel for controlling the intensity of the light output from 10 to 100 percent.
16. The luminaire shall have a power supply (electronic driver) that is terminated with quick disconnect wire harnesses for easy maintenance. Wire nut termination is not acceptable.
17. The luminaire shall have a terminal block for terminating wiring to the luminaire. The terminal block shall be a 3 station, tunnel lug terminal board that will accommodate #6 thru #18 AWG pole wire.
18. Fixture shall have a surge protection that meets ANSI/IEEE C62.41.
19. The luminaire shall have life rating on all electrical components of 100,000 hours or greater when operated at 25 ° C (77 ° F).
20. All LED components shall be L70 rated when operated in a luminaire at 25 ° C (77 ° F) at 100,000 hours.
21. Electrical components shall be protected per ANSI/IEEE standard C62.41, for Class C applications.
22. The LED shall lose no more than a 15% optical intensity of initial delivered lumens due to thermal loading when operated at 25 ° C (77 ° F).
23. The LED shall deliver an average 80% of initial delivered lumens after 70,000 hours of operation when operated at 25 ° C (77 ° F).
24. The LED shall have a minimum Luminaire efficacy of 80 lumens/watt.
25. The Correlated Color Temperature (CCT) shall be 4000K or 5000K with a variance of 250K, white, that conforms to LM-79. All fixtures in the design shall utilize the same CCT throughout.
26. The minimum color rendering index (CRI) shall not be less than 70.
27. The optics shall have a completely sealed optical system.
28. The TM-21 Report must show the drive current used for the submitted luminaire. The report can show a larger drive current to represent a worst case scenario.
29. The Lumen Maintenance Life L80 from the TM-21 Report must not be below 80% at 70,000 hours at 25 ° C (77°F).
30. In hazardous area Luminaire shall be listed to UL 1598 Wet Locations standard.
  - a. Lenses: Tempered glass.
  - b. Mechanical:
    - 1) Streamed ribbed corrosion resistant, copper free extruded aluminum body.
    - 2) Extruded aluminum lens frame.
    - 3) Cast aluminum end caps with molded eye-bolt hubs.

C. Exit Signs and Emergency Lighting Units:

1. UL 924.
2. NFPA 101.

**2.4 LAMPS**

- A. Incandescent: No incandescent lamps required for this project.
- B. LED: As scheduled on drawing.

**2.5 POLES**

- A. As scheduled or noted on the Drawings.

**2.6 MAINTENANCE MATERIALS**

- A. Furnish a minimum of 2 or 10 percent of total of each type and wattage of lamps, whichever is greater.
- B. Furnish a minimum of 10 percent of total of each type and amperage of fuses for fixtures indicated to be fused.
- C. Spare parts are to be stored in a box clearly labeled as to its contents.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Coordinate fixture types with ceiling construction.
  - 1. Provide mounting hardware for the ceiling system in which the fixture is to be installed.
- B. Fasten lighting fixtures supported by suspended ceiling systems to ceiling framing system with hold down clips.
- C. Provide mounting brackets and/or structural mounting support for wall-mounted fixtures.
  - 1. Do not support fixture from conduit system.
  - 2. When fixtures are supported from outlet boxes, install per NFPA 70.
  - 3. Supports for fixtures mounted on exterior walls shall not be attached to exterior face of the wall.
- D. Provide pendant fixtures with swivel hangers which will allow fixture to swing in any direction but will not permit stem to rotate.
  - 1. Provide hangers with enclosure rating (NEMA 1, 4, or 7) equal to enclosure requirements of area in which they are installed.
  - 2. Swivel hangers for fixtures in mechanical equipment areas: Shock absorbing type.
- E. Pendant mounted, open, industrial fluorescent fixtures:
  - 1. Not in continuous rows, shall be supported by conduit or by approved chains:
    - a. Hardwired to ceiling mounted junction box.
- F. Locate fixtures in accordance with reflected ceiling plans.
- G. Locate in exact center of tile when indicated.
  - 1. Relocate misplaced fixtures and replace damaged ceiling materials.
- H. Mount lighting fixtures at heights indicated in Section 16010 or per fixture schedule or as indicated on Drawings.
- I. Install exterior fixtures so that water can not enter or accumulate in the wiring compartment.
- J. Ground fixtures and ballasts.

### **3.2 ADJUST AND CLEAN**

- A. Replace all inoperable lamps with new lamps prior to final acceptance.
- B. Aim all emergency lighting units, so that, the path of egress is illuminated.

**END OF SECTION**

**HDR**

**A P P E N D I X**

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**APPENDIX A**  
KENTUCKY DIVISION OF WATER APPROVAL LETTER

*(TO BE INSERTED UPON RECEIPT FROM DOW)*