PROJECT MANUAL FOR

POWELL'S VALLEY WATER DISTRICT

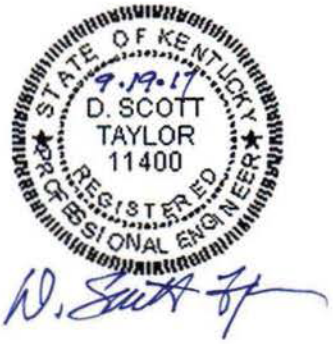
POWELL COUNTY, KENTUCKY

WATER SYSTEM IMPROVEMENTS

CONTRACT 1: PUMP STATIONS AND WATER LINE EXTENSIONS
CONTRACT 2: WATER STORAGE TANKS IMPROVEMENTS

July 2017

MSE of Kentucky
624 Wellington Way
Lexington, KY 40503
859-223-5694



POWELLS VALLEY WATER DISTRICT

POWELL COUNTY, KENTUCKY

WATER SYSTEM IMPROVEMENTS PROJECT

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SECTION 00020

ADVERTISEMENT FOR BIDS

Owner: Powells Valley Water District
Address: 31 Adams Ridge Road, Clay City, Kentucky 40312
Project: Powells Valley Water Project Contracts 1 & 2

Sealed Bids for Water System Improvements Contract 1 – Pump Stations and Water Line Extensions and Contract 2 – Water Storage Tanks Improvements will be received by Steve Everman, Chairman of the Powells Valley Water District, at the office of the Powell County Judge Executive, Powell County Courthouse, Stanton, Kentucky until 1:00 PM, local time, August 17, 2017 and then at said office will be publicly opened and read aloud. A pre-bid meeting will be held at 1:00 p.m., August 10, 2017 at the Water District Office, 31 Adams Ridge Road, Clay City, Kentucky. General questions may be directed to Kendell Knox, Manager at 606-663-5870.

The work consists of 3" PVC water line installation, reconnection of services and new service installations, 2 pump station renovations, construction of a new water booster pump station, sandblasting and re-painting of a ground storage tank and 3 tank renovations installing internal piping and valves.

Bids shall be on a lump sum and unit price basis as indicated in the Bid Form. The CONTRACT DOCUMENTS may be reviewed at the following locations:

MSE Web Site: mselex.com under Bid Opportunities
Powells Valley Water District, 31 Adams Ridge Road, Clay City, Kentucky 40312

Copies of the Contract Documents may be obtained at the Issuing Office of Lynn Imaging, 328 E. Vine St. Lexington, KY 40507, (859) 226-5850 or at http://www.lynnimaging.com. upon receipt of a check made payable to Lynn Imaging in the amount of $150.00 (non-refundable) and a check made payable to MSE of Kentucky, Inc. of $100.00 (refunded when specs and plans are returned to Lynn Imaging within 30 days). All orders must be prepaid. There will be a 24 hour turn-around on all orders. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

A certified check or bank draft, payable to the Powells Valley Water District, government bonds, or a satisfactory bid bond executed by the bidder and acceptable sureties in an amount equal to five percent of the bid shall be submitted with bid. The successful bidder will be required to furnish and pay for the following: 1) 5% Bid Bond; and 2) A performance and payment bond for 100% of the contract price.

Bid security shall be furnished in accordance with the Instructions to Bidders.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions of this advertisement and/or the specifications and may waive any informalities or reject any and all Bids. Any proposal received after the time and date specified shall not be considered and will be returned unopened to the proposer.

Sealed bid should be labeled "Powells Valley Water Project, not to be opened until 1:00 p.m. local prevailing time, August 17, 2017." If forwarded by mail or other shipper, sealed bid should be enclosed in another envelope and addressed to: Powells Valley Water District, PO Box 550, Clay City, Kentucky 40312, Attn: Steve Everman. No Bidder may withdraw his Bid for a period of ninety (90) days after the actual date of the opening thereof.

Award will be made to the lowest, responsive, responsible bidder. Bidding is for the sole benefit of the Powells Valley Water District. This is not an offer to enter into a contract.

The Powells Valley Water District is an Equal Employment Opportunity Employer.

Powells Valley Water District
Clay City, KY

SECTION 00200

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

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

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

B. *Bidder*--The individual or entity who submits a Bid directly to Owner.

C. *Successful Bidder*--The lowest responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluations as hereinafter provided) makes an award.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

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

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

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

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within [5] days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:

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

B. [Bidder's state or other contractor license number, if applicable.]

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

D. [Other required information regarding qualifications]

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

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

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

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

4.01 Site and Other Areas

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

4.02 Existing Site Conditions

B. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.

b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

C. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

D. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in

the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 Site Visit and Testing by Bidders

E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of site conditions.

F. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.

G. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

H. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 Owner's Safety Program

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

4.05 Other Work at the Site

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

ARTICLE 5 – BIDDER'S REPRESENTATIONS

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

A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;

B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;

D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or

adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;

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

F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;

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

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

I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and

J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

6.01 A pre-Bid conference will be held at 1:00 p.m., August 10, 2017 at the Water District Office, 31 Adams Ridge Road, Clay City, Kentucky.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

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

7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of [5] percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

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

ARTICLE 10 – LIQUIDATED DAMAGES

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

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids in the case of proposed substitute and 5 days prior in the case of a proposed "or-equal." Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be

final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner. Substitutes and "or-equal" materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.04 and 7.05 of the General Conditions after the Effective Date of the Contract.

11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

11.03 If an award is made, Contractor shall be allowed to submit proposed substitutes and "or-equals" in accordance with the General Conditions.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If required by the bid documents the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the Work.

If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

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

12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated on SC 7.06.

ARTICLE 13 – PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink.

Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.

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

13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.

13.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.

13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.

13.07 All names shall be printed in ink below the signatures.

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

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

13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 Lump Sum

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

14.02 Unit Price

B. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

C. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and

Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

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

14.03 Allowances

A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.

15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to Powells Valley Water District, PO Box 550, Clay City, KY 40312, attn.: Steve Everman, Chairman.

15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

15.04 Each bid must be submitted on the prescribed form and accompanied by Certification of Bidder Regarding Equal Employment Opportunity, Form 950.1; Certification of Bidder (Contractor) Concerning Labor Standards and Prevailing Wage Requirements, Form 1421; Certification of Bidder Regarding Section 3 and Segregated Facilities: and Contractor Eligibility Certification Regarding Debarment, Suspension and Other Responsibilities. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures, and the foregoing Certifications must be fully completed and executed when submitted.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.

16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

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

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder who's Bid, conforming to all the material terms and conditions of the Advertisement for Bids, is lowest, price and other facts considered, unless all bids are rejected. All bids shall not be rejected without proper justification. submitting the lowest responsive Bid.

19.03 Evaluation of Bids

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

B. In the comparison of Bids, deductive alternates will be applied in the same order of priority as listed in the Bid Form (A first, then B,C, D, etc.). To determine the Bid prices for purposes of comparison, Owner shall announce to all bidders a "Base Bid" budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing

so would cause the contract to be within budget. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid less any combination of its deductive alternate Bids for which Owner determines funds will be available at the time of award.

19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

19.06 In evaluating Bids, it is the Owner's intent to award both Contracts to a single Bidder. Therefore, the evaluation of lowest price Bid shall be the sum of both contracts

ARTICLE 20 – BONDS AND INSURANCE

20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

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

ARTICLE 22 – SALES AND USE TAXES – NOT APPLICABLE

ARTICLE 23 – CONTRACTS TO BE ASSIGNED - NOT APPLICABLE

ARTICLE 24 – WAGE RATE REQUIREMENTS

24.01 If the contract price is in excess of $100,000, provisions of the Contract Work Hours and Safety Standards Act at 29 CFR 5.5(b) apply.

SECTION 00310

BID FORM

WATER SYSTEM IMPROVEMENTS

CONTRACT 1: PUMP STATIONS AND WATER LINE EXTENSIONS

CONTRACT 2: WATER STORAGE TANKS IMPROVEMENTS

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Powells Valley Water District
PO Box 550
Clay City, KY 40312
Attn: Steve Everman, Chairman

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

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

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

Addendum No.	**Addendum, Date**
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. NOT USED

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

precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. 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.

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

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

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.1 Bidder certifies that:

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

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

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

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

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

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

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

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

CONTRACT 1: PUMP STATIONS AND WATER LINE EXTENSIONS
ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s): (See attached bid schedule on the following pages)

Bidder agrees to perform all the work in the Specifications and what is shown on the Drawings for the following unit prices:

BID SCHEDULE

ITEM & DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	TOTAL
1. Water Line. Furnish all labor, equipment and materials and install water line, including trenching, bedding, backfill, thrust-blocking, testing, and other subsidiary work. Excavation is unclassified. Pipe will be measured along the center line of the pipe from the center of the connecting fitting to the end of the pipe with no deductions for valves and fittings. Carrier pipe installations in special crossings will be included in this item. All fittings shall be mechanical joint ductile iron pipe. Include 12 gauge tracer wire as shown on details.				
3" PVC Class 200	2000	L.F.	$_____	$_____
2. Gate Valve Assembly. Furnish all labor, equipment and materials and install gate valves, including thrust-blocking, any necessary fittings, valve boxes, covers and extensions. Include 12 gauge tracer wire as shown on details.				
3" Gate Valves	1	Ea.	$_____	$_____
3. Casing Pipe Installed by Open Cutting. Furnish all labor and equipment and install six inch steel casing pipe by open cutting.				
Casing Pipe for 3" Main, Open Cut	30	L.F.	$_____	$_____
4. Creek Crossings. Installation of special creek crossings with casing pipes as shown on the plans or as required by the Engineer. Does not include cost of carrier pipe.				
A. Type "A" Crossing with casing pipe	12	L.F.	$_____	$_____
5. Air Release Valves. Furnish all labor, equipment and materials and install air release valves. Valve shall be installed at a local high spot as shown on the plans or by the Engineer's representative.				
Air Release Valves	2	Ea.	$_____	$_____
6. New Water Meter Assembly. Furnish all labor, equipment and materials and install water meter assemblies per details, including ¾ inch CTS HDPE service line and corporation stop.				
Water Meter Assembly	2	Ea.	$_____	$_____
7. Water Meter Reconnection. Furnish all labor, equipment and materials and reconnect existing water meter assemblies to new water main, including ¾ inch CTS HDPE service line and corporation stop.				
Water Meter Reconnection	3	Ea.	$_____	$_____

8. Flush Hydrant Assembly. Furnish all labor, equipment and materials and install flush hydrant assemblies per detail. Includes excavation, pipe, fittings, gate valve, thrust blocking and backfilling.

3" Blow-off Assembly	1	Ea.	$_____	$_____

9. Connection to Existing Water Line. Furnish all labor, equipment and materials and connect to existing main with tapping assembly with valve.

3" Tie-in w/ tapping valve & sleeve	2	Ea.	$_____	$_____

10. Pavement Replacement. Furnish all labor, equipment and materials and replace crushed stone, or bituminous pavement replacement as required.

A. Light Duty Bituminous Pavement	64	S.Y.	$_____	$_____
B. Crushed Stone Pavement	500	L.F.	$_____	$_____

Water Line Construction Sub-Total (Items 1-11) $_____

Deductive Alternates:

A. Renovation of Happy Top Pump Station. Furnish all labor, equipment and materials to upgrade stations for 3 phase VFD operations. Includes breakers, starters, wiring, telemetry system at the station and at the main panel at the office, associated piping and valves, electrical connections for a complete operable pump station plus an allocation for power company 3 phase lines.

Power Company 3 Phase Extension	L.S	$ 55,000
Happy Top Pump Station	L.S.	$_____

B. Renovation of Ballard Pump Station. Furnish all labor, equipment and materials to upgrade the station for VFD operations. Includes breakers, starters, wiring, telemetry system at the station and at the main panel at the office, associated piping and valves, electrical connections for a complete operable pump station.

Ballard Pump Station	L.S.	$_____

C. Beech Fork Pump Station. Furnish all labor, equipment and materials for a complete new water booster pump station. Includes housing, motors, pumps, breakers, starters, wiring, telemetry system at the station and at the main panel at the office, associated piping and valves, electrical connections for a complete operable pump station.

Beech Fork Pump Station	L.S.	$_____

TOTAL BID (Items 1-11 plus A through D) $_____

ARTICLE 6 – TIME OF COMPLETION

6.1 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.2 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.1 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors; (**Bidder's Questionnaire)**

C. List of Proposed Suppliers; **(Bidder's Questionnaire)**

D. List of Project References; **(Bidder's Questionnaire)**

E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

F. Contractor's License No.:_____ **[or]** Evidence of Bidder's ability to obtain a State
Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;

G. Required Bidder Qualification Statement with supporting data; and

H. If Bid amount exceeds $10,000, signed Compliance Statement (RD 400-06). Refer to specific equal opportunity requirements set forth in the Supplemental General Conditions;

I. If Bid amount exceeds $25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions (AD-1048);

J. If Bid amount exceeds $100,000, signed RD instruction 1940-Q, Exhibit A-1, Certification for Contracts, Grants, and Loans.

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

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

_____

By:
[Signature] _____

[Printed name] _____

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

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)

CONTRACT 2: WATER STORAGE TANK IMPROVEMENTS
ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s): (See attached bid schedule on the following pages)

Bidder agrees to perform all the work in the Specifications and what is shown on the Drawings for the following unit prices:

BID SCHEDULE

ITEM & DESCRIPTION	ESTIMATED UNIT	UNIT PRICE	TOTAL

1) Furnish all labor, equipment and materials to sandblast and repaint Frames Branch 100,000 G ground storage tank, install tank mixing system, including interior and exterior cleaning, blasting and repainting, minor tank appurtenance repairs, control of fugitive emissions, site clean-up and other subsidiary work.

Sandblast and Repaint Frames Branch Tank LS $_____

Deductive Alternates:

A) Furnish all labor, equipment and materials and install tank mixing system valves, fittings and piping including thrust-blocking, any necessary fittings, valves, brackets and bracing, repairs of all damaged surfaces, cleaning and disinfection and other subsidiary work.

Furnace Mountain Tank Mixing System LS $_____

B) Furnish all labor, equipment and materials and install tank mixing system valves, fittings and piping including thrust-blocking, any necessary fittings, valves, brackets and bracing, repairs of all damaged surfaces, cleaning and disinfection and other subsidiary work.

Mulch Plant Tank Mixing System LS $_____

TOTAL BID (Items 1 and A through B) $_____

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

6.3 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.4 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.2 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors; (**Bidder's Questionnaire)**

C. List of Proposed Suppliers; **(Bidder's Questionnaire)**

D. List of Project References; **(Bidder's Questionnaire)**

E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

F. Contractor's License No.:_____ **[or]** Evidence of Bidder's ability to obtain a State
Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;

G. Required Bidder Qualification Statement with supporting data; and

H. If Bid amount exceeds $10,000, signed Compliance Statement (RD 400-06). Refer to specific equal opportunity requirements set forth in the Supplemental General Conditions;

I. If Bid amount exceeds $25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions (AD-1048);

J. If Bid amount exceeds $100,000, signed RD instruction 1940-Q, Exhibit A-1, Certification for Contracts, Grants, and Loans.

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

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

_____

By:
[Signature] _____

[Printed name] _____

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

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)

BIDDER'S QUALIFICATIONS

The Bidder's Qualifications are required by the Owner to be submitted as set forth herewith:

A. Permanent place of business is maintained at:

_____

1. Under headings shown below, Bidder is requested to list and describe all equipment (i.e. backhoes, trenching machines, pipe pushing machines, air compressors, trucks, tractors, track hoes, concrete mixers, pumps, etc.) which he owns and plans to use to perform proposed work. If any of the equipment is not owned by the Bidder he must furnish the Owner written evidence that he has obtained firm commitments from the equipment owner to use or purchase such equipment. Attach a rider if necessary.

EQUIPMENT	TYPE	CAPACITY	CONDITION / AGE

2. Experience of Contractor on other **similar** work (description of work, owner, location, if pipeline list type of pipe):

Project Owner	Contact Name/Phone	Project Description	Contract Amount
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$

We now have the following jobs under contract and bonded (list all construction now under contract):

JOB LOCATION TOTAL AMOUNT

_____ _____ $_____

_____ _____ $_____

_____ _____ $_____

_____ _____ $_____

_____ _____ $_____

_____ _____ $_____

_____ _____ $_____

Respectfully Submitted:

_____

(Name of Contracting Firm)

By_____

Title_____

Date_____

USDA
Form RD 400-6
(Rev. 4-00)

Form Approved
OMB No. 0575-0018

COMPLIANCE STATEMENT

This statement relates to a proposed contract with _____

_____
(Name of borrower or grantee)

who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the undersigned bidder or prospective contractor, I represent that:

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

2. If I have participated in such a contract or subcontract, ☐ I have, ☐ have not, filed all compliance reports that have been required to file in connection with the contract or subcontract.

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

3. ☐ I have, ☐ have not previously had contracts subject to the written affirmative action programs requirements of the Secretary of Labor.

4. If I have participated in such a contract or subcontract, ☐ I have, ☐ have not developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

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

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

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

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

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

Date _____ _____

(Signature of Bidder or Prospective Contractor)

_____

Address (including Zip Code)

U.S. DEPARTMENT OF AGRICULTURE

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017, Section 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, *Federal Register* (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name	PR/Award Number or Project Name
Name and Title of Authorized Representative	
Signature	Date (mm/dd/yyyy)

INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms ``covered transaction,'' ``debarred,'' ``suspended,'' ``ineligible,'' ``lower tier covered transaction,'' ``participant,'' ``person,'' ``primary covered transaction,'' ``principal,'' ``proposal,'' and ``voluntarily excluded,'' as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled ``Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions,'' without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participating in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

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

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

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

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

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 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.

_____ _____

(name) (date)

_____

(title)

CERTIFICATE OF OWNER'S ATTORNEY AND AGENCY CONCURRENCE

CERTFICATE OF OWNER'S ATTORNEY

PROJECT NAME: _____

CONTRACTOR NAME: _____

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

_____

Name Date

AGENCY CONCURRENCE

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

_____

Agency Representative Date

_____

Name

ENGINEER'S CERTIFICATION OF FINAL PLANS AND SPECIFICATIONS

PROJECT NAME: POW ELLS V ALLEY W ATER DIS CTRICT - W ATER S YSTEM IMPROVEMENTS PROJECT

The final Drawings and Specifications, other assembled Construction Contract Docum ents, bidding related documents (or requests for pr oposals or other construction procurem ent documents), and any other Final Design Phase deliver ables, comply with all requ irements of the U.S. Departm ent of Agricu lture, Rural Utilitie s Service, to the best of m y knowledge and professional judgment.

If the Eng ineers Joint Contract Documents Committee (EJCDC) docum ents have been used, all modifications required b y RUS Bulletin 1780 -26 have been made in accordance to the term s of the license agreem ent, which states in part that the Engineer "m ust plainly show all changes to the Standard EJCDC Text, using ' Track Change s' (redline/strikeout), highlighting, or other means of clearly indicating additions and deletions." Such other m eans may include attachments indicating changes (e.g. Supplementary Conditions modifying the General Conditions).

MSE of Kentucky, Inc.

Engineer Date

Name and Title

Solicitation/Contract #: _____

REQUIRED AFFIDAVIT FOR BIDDERS, OFFERORS AND CONTRACTORS

FOR BIDS AND CONTRACTS IN GENERAL:

I. Each bidder or offeror swears and affirms under penalty of perjury, that:

a. In accordance with KRS 45A.110 and KRS 45A.115, neither the bidder or offeror as defined in KRS 45A.070(6), nor the entity which he/she represents, has knowingly violated any provisions of the campaign finance laws of the Commonwealth of Kentucky; and the award of a contract to the bidder or offeror or the entity which he/she represents will not violate any provisions of the campaign finance laws of the Commonwealth.

b. The bidder or offeror swears and affirms under penalty of perjury that, to the extent required by Kentucky law, the entity bidding, and all subcontractors therein, are aware of the requirements and penalties outlined in KRS 45A.485; have properly disclosed all information required by this statute; and will continue to comply with such requirements for the duration of any contract awarded.

c. The bidder or offeror swears and affirms under penalty of perjury that, to the extent required by Kentucky law, the entity bidding, and its affiliates, are duly registered with the Kentucky Department of Revenue to collect and remit the sales and use tax imposed by KRS Chapter 139, and will remain registered for the duration of any contract awarded.

d. The bidder or offeror swears and affirms under penalty of perjury that the entity bidding is not delinquent on any state taxes or fees owed to the Commonwealth of Kentucky and will remain in good standing for the duration of any contract awarded.

FOR "NON-BID" CONTRACTS (I.E. SOLE-SOURCE; NOT-PRACTICAL OR FEASIBLE TO BID; OR EMERGENCY CONTRACTS, ETC):

II. Each contractor further swears and affirms under penalty of perjury, that:

a. In accordance with KRS 121.056, and if this is a non-bid contract, neither the contractor, nor any member of his/her immediate family having an interest of 10% or more in any business entity involved in the performance of any contract awarded, have contributed more than the amount specified in KRS 121.150 to the campaign of the gubernatorial slate elected in the election last preceding the date of contract award.

b. In accordance with KRS 121.330(1) and (2), and if this is a non-bid contract, neither the contractor, nor officers or employees of the contractor or any entity affiliated with the contractor, nor the spouses of officers or employees of the contractor or any entity affiliated with the contractor, have knowingly contributed more than $5,000 in aggregate to the campaign of a candidate elected in the election last preceding the date of contract award that has jurisdiction over this contract award.

Solicitation/Contract #: _____

REQUIRED AFFIDAVIT FOR BIDDERS, OFFERORS AND CONTRACTORS **PAGE 2 OF 2**

c. In accordance with KRS 121.330(3) and (4), and if this is a non-bid contract, to the best of his/her knowledge, neither the contractor, nor any member of his/her immediate family, his/her employer, or his/her employees, or any entity affiliated with any of these entities or individuals, have directly solicited contributions in excess of $30,000 in the aggregate for the campaign of a candidate elected in the election last preceding the date of contract award that has jurisdiction over this contract.

As a duly authorized representative for the bidder, offeror, or contractor, I have fully informed myself regarding the accuracy of all statements made in this affidavit, and acknowledge that the Commonwealth is reasonably relying upon these statements, in making a decision for contract award and any failure to accurately disclose such information may result in contract termination, repayment of funds and other available remedies under law.

_____ _____
Signature Printed Name

_____ _____
Title Date

Company Name _____

Address _____

_____

_____

Subscribed and sworn to before me by _____ _____
(Affiant) (Title)

of _____ this _____day of _____,20___.
(Company Name)

_____
Notary Public

[seal of notary] My commission expires: _____

SECTION 00320

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:

Description *(Project Name— Include Location)*:

BOND

Bond Number:

Date:

Penal sum _____ $ _____

(Words) (Figures)

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

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

Note: Addresses are to be used for giving any required notice.
Provide execution by any additional parties, such 0as joint venturers, if necessary.

SECTION 00320

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

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

3. This obligation shall be null and void if:

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

3.2 All Bids are rejected by Owner, or

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

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

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

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

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

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

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

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

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

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE OF AWARD

Date of Issuance:

Owner: | Owner's Contract No.:

Engineer: MSE of Kentucky, Inc. | Engineer's Project No.:

Project: | Contract Name:

Bidder:

Bidder's Address:

TO BIDDER:

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

_____.

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

The Contract Price of the awarded Contract is: $ _____ subject to unit prices.

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

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

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

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

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

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

Owner:

Authorized Signature

By:

Title: Chairman

Copy: Engineer

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT

THIS AGREEMENT is by and between Powells Valley Water District ("Owner") and _____ _____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: Completion of the Powells Valley Water District – Water System Improvements Project.

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Powells Valley Water District Contract 1: Pump Stations and Water Line Extensions and Contract 2: Water Storage Tank Improvements.

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by MSE of Kentucky, Inc.

3.02 The Owner has retained MSE of Kentucky, Inc. ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Days*

A. The Work will be substantially completed on or before 120 calendar days, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions.

4.03 *Liquidated Damages*

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

delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner $1,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

4.04 *[Deleted]*

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

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

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the Last day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract

   a. 95 percent of Work completed (with the balance being retainage); ~~If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and~~

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

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

ARTICLE 7 – INTEREST

7.01 NOT USED.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. NOT USED.

E. NOT USED.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. 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.

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

I. The Contract Documents are generally sufficient to indicate and convey understanding of all

terms and conditions for performance and furnishing of the Work.

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

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

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

2. Performance bond (pages 1 to 3, inclusive).

3. Payment bond (pages 1 to 3, inclusive).

4. Other bonds. N/A

   a. (pages ____ to _, inclusive).

5. General Conditions (pages 1 to 71, inclusive).

6. Supplementary Conditions (pages 1 to15, inclusive).

7. Specifications as listed in the table of contents of the Project Manual.

8. Drawings (not attached but incorporated by reference) consisting of 11 sheets with each sheet bearing the following general title: listed as Powells Valley Water District – Water System Improvements Project [or] the Drawings listed on the attached sheet index.

9. Addenda (numbers _ to _, inclusive).

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

    a. Contractor's Bid (pages ____ to ___, inclusive).

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

    a. Notice to Proceed.

    b. Work Change Directives.

    c. Change Orders.

    d. Field Orders.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly

noted otherwise above).

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

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

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

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

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence

the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

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

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

10.06 *Other Provisions*

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

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

This Agreement will be effective on _____, 2016 (which is the Effective Date of the Contract).

OWNER:
Powells Valley Water District

_____

By:

Title: Chairman

Attest: _____

Title: _____

Address for giving notices:

_____

_____

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

CONTRACTOR:

_____

By:

Title:

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

Attest: _____

Title: _____

Address for giving notices:

_____

_____

License No.: _____
(where applicable)

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

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

SECTION 00600

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

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

Amount:

Modifications to this Bond Form: None ☐ See Paragraph 16 ☐

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

CONTRACTOR AS PRINCIPAL	**SURETY**
(seal)	*(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By:	**By:**
Signature	Signature *(attach power of attorney)*
Print Name	Print Name
Title	Title
Attest:	**Attest:**
Signature	Signature
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable. (3) Bond must be at least 100% of the bid amount.

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

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

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

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

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

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

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

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

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

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

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

14. Definitions

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

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

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

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

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

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

16. Modifications to this Bond are as follows:

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

SECTION 00602

PAYMENT BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

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

CONTRACTOR AS PRINCIPAL

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

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

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

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

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable. (3) Bond must be at least 100% of the bid amount.

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

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

    5.1 Claimants who do not have a direct contract with the Contractor,

        5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

        5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

    5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

    7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

    7.2 Pay or arrange for payment of any undisputed amounts.

    7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

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

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

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

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

    16.1 **Claim:** A written statement by the Claimant including at a minimum:

        1. The name of the Claimant;
        2. The name of the person for whom the labor was done, or materials or equipment furnished;
        3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
        4. A brief description of the labor, materials, or equipment furnished;
        5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
        6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
        7. The total amount of previous payments received by the Claimant; and
        8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

    16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

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

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

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

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

18. Modifications to this Bond are as follows:

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE TO PROCEED

Date of Issuance:

Owner: | Owner's Contract No.:

Engineer: MSE of Kentucky, Inc. | Engineer's Project No.:

Project: | Contract Name:

Bidder:

Bidder's Address:

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on _____. 2016 *[see Paragraph 4.01 of the General Conditions]*

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

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

Owner:

Authorized Signature

By:

Title: Chairman

Date Issued:

Copy: Engineer

SECTION 00700

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

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Issued and Published Jointly by

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AMERICAN COUNCIL OF ENGINEERING COMPANIES

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

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

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

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision

regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

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

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

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

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

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

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

28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

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

34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

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

36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and

submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

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

38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

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

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

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

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

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the

result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

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

1.02 *Terminology*

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

B. *Intent of Certain Terms or Adjectives*:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*:

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

D. *Defective*:

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

a. does not conform to the Contract Documents; or

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

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

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

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

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

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

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:

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

2. a preliminary Schedule of Submittals; and

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

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

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

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

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

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

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*:

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

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

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

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract

Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility

that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

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

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

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

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

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

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise;

(b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

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

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

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

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

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and

procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

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

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

5.04 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or

2. is of such a nature as to require a change in the Drawings or Specifications; or

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

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or

decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

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

b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice as required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

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

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

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

a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

d. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

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

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

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required

by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this

Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or

authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

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

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

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

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall be maintained for three years after final payment.

b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.

5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

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

6.05 *Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available

under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
10. not include a co-insurance clause.
11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
12. include performance/hot testing and start-up.
13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will

provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

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

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

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of

recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

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

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

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

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

4) it is not objectionable to Owner.

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

1) there will be no increase in cost to the Owner or increase in Contract Times; and

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

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

a. shall certify that the proposed substitute item will:

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

2) be similar in substance to that specified, and

3) be suited to the same use as that specified.

b. will state:

1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,

2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

c. will identify:

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

2) available engineering, sales, maintenance, repair, and replacement services.

d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

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

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

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

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

M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

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

O. Nothing in the Contract Documents:

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

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

7.07 *Patent Fees and Royalties*

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

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

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

7.08 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

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

7.10 *Laws and Regulations*

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

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

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

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

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

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

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

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

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

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

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of

Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

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

a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

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

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

1. *Shop Drawings*:

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

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples*:

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

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

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

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

E. *Resubmittal Procedures*:

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

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

3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

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

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

5. any review and approval of a Shop Drawing or Sample submittal;

6. the issuance of a notice of acceptability by Engineer;

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

8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

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

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any

limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

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

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

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

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

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

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner

may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. an itemization of the specific matters to be covered by such authority and responsibility; and

3. the extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor

must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

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

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

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

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

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

11.01 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

1. *Change Orders*:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change

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

11.03 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

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

a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and

11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

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

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action*: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole,

approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

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

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*:

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction,

the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:

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

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

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

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

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

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

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

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

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

    h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

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

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

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

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

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

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

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

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

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 *Unit Price Work*

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

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

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

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

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

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

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

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

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

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

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*:

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

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

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for

Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

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

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

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

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

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

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

   d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

   a. the Work is defective, requiring correction or replacement;

   b. the Contract Price has been reduced by Change Orders;

   c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

   d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

   e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*:

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

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

    b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

    c. Contractor has failed to provide and maintain required bonds or insurance;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

    e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

    f. the Work is defective, requiring correction or replacement;

    g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    h. the Contract Price has been reduced by Change Orders;

    i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

    j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

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

    l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction

imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

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

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

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor

may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

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

15.04 *Partial Use or Occupancy*

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

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

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

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all disputes that Contractor believes are unsettled; and

   e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer

(less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with

respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

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

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs,

losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

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

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the

Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

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

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of

them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

SECTION 00800

SUPPLEMENTARY CONDITIONS

GENERAL

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

SC-1.01.A.8 Add the following language at the end of last sentence of Paragraph 1.0.A.8:

The Change Order form to be used on this Project is EJCDC C-941. Agency approval is required before Change Orders are effective.

SC-1.01.A.48 Add the following language at the end of eh last Paragraph 1.01A.48:

A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

SC-1.01.A.49 Add the following new Paragraph after Paragraph 1.01.A.48:

Abnormal Weather Conditions – Conditions of extreme or unusual weather for a given region, elevation, or season as determined by Engineer. Extreme or unusual weather that is typical for a region, elevation, or season should not be considered Abnormal Weather Conditions.

SC 1.01.A.50 Add the following new Paragraph after Paragraph 1.01.A.49:

Agency - The Project is financed in whole or in part by USDA Rural Utilities Service pursuant to the Consolidated Farm and Rural Development Act (7 USC Section 1921 et seq.). The Rural Utilities Service programs are administered through the USDA Rural Development offices; therefore, the Agency for these documents is USDA Rural Development.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.02 C Copies of Documents

SC 2.02.A Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor five copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

SC-2.06 Electronic Transmittals

SC- 2.06.B Delete Paragraph 2.06.B and replace it with the term [Deleted].

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

NO CHANGE

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01 Commencement of Contract Times; Notice to Proceed

SC 4.01.A Amend the last sentence of Paragraph 4.01.A by striking out the following words: In no event will the Contract Times commence to run later than the ninetieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

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

SC-5.03 Subsurface and Physical Conditions

SC 5.03 Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:

A. No reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

B. Not Used.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.03 Contractor's Insurance

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:		**Statutory**
Federal, if applicable (e.g., Longshoreman's):		**Statutory**
Jones Act coverage, if applicable:		
Bodily injury by accident, each accident	**$**	**N/A**
Bodily injury by disease, aggregate	**$**	**N/A**
Employer's Liability:		
Bodily injury, each accident	**$**	**500,000**
Bodily injury by disease, each employee	**$**	**500,000**
Bodily injury/disease aggregate	**$**	**500,000**
For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	**$**	**N/A**
Foreign voluntary worker compensation		**Statutory**

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	**$ 2,000,000**
Products - Completed Operations Aggregate	**$ 1,000,000**
Personal and Advertising Injury	**$ 1,000,000**
Each Occurrence (Bodily Injury and Property Damage)	**$ 1,000,000**

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:	
Each person	**$ 500,000**
Each accident	**$ 1,000,000**
Property Damage:	
Each accident	**$ 1,000,000**
[or]	
Combined Single Limit of	**$ 1,000,000**

4. Excess or Umbrella Liability:

Per Occurrence	**$ 1,000,000**
General Aggregate	**$ 1,000,000**

5. Contractor's Pollution Liability:

Each Occurrence	**$ N/A**
General Aggregate	**$ N/A**

☒ **If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract**

6. Additional Insureds: Powells Valley Water District and MSE of Kentucky, Inc. shall be included on policy as Additional Insureds.

7. Contractor's Professional Liability:

Each Claim	**$ N/A**
Annual Aggregate	**$ N/A**

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.02 *Labor; Working Hours*

SC-7.02.C. **Add the following new paragraph immediately after Paragraph 7.02.B:**

Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-7.04 *"Or Equals"*

SC-7.04.A **Amend the third sentence of Paragraph 7.04.A by striking out the following words:**

Unless the specification or description contains or is followed by words reading that no like, equivalent, or 'or-equal' item is permitted.

SC 7.04.A.1 **Amend the last sentence of Paragraph a.3 by striking out "and;" and adding a period at the end of the Paragraph.**

SC 7.04.A.1 **Delete paragraph 7.04.A.1.a.4 in its entirety and insert the following in its place:**

[Deleted]

SC-7.06 *Concerning Subcontractors, Suppliers, and Others*

SC 7.06.A **Amend Paragraph 7.06.A by adding the following text to the end of the Paragraph:**

The Contractor shall not award work valued at more than fifty percent of the Contract Price to Subcontractor(s).

SC 7.06.B **Delete paragraph 7.06.B in its entirety and insert the following in its place:**

[Deleted]

SC 7.06.E **Amend the second sentence of Paragraph 7.06.E by striking out "Owner may also require Contractor to retain specific replacements; provided, however, that".**

ARTICLE 8 – OTHER WORK AT THE SITE

NO CHANGE

ARTICLE 9 – OWNER'S RESPONSIBILITIES

NO CHANGE

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.

4. Liaison:

a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

6. Shop Drawings and Samples:

a. **Record date of receipt of Samples and Contractor-approved Shop Drawings.**

b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.

7. **Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.**

8. **Review of Work and Rejection of Defective Work:**

    a. **Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.**

    b. **Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.**

9. **Inspections, Tests, and System Start-ups:**

    a. **Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.**

    b. **Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.**

10. **Records:**

    a. **Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.**

    b. **Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.**

    c. **Maintain records for use in preparing Project documentation.**

11. **Reports:**

    a. **Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.**

    b. **Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.**

c. **Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.**

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

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

14. **Completion:**

    a. **Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.**

    b. **Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.**

    c. **Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.**

C. **The RPR shall not:**

1. **Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).**

2. **Exceed limitations of Engineer's authority as set forth in the Contract Documents.**

3. **Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.**

4. **Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.**

5. **Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.**

6. **Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.**

7. **Accept Shop Drawing or Sample submittals from anyone other than Contractor.**

8. **Authorize Owner to occupy the Project in whole or in part..**

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

SC-11.07 Execution of Change Orders

SC 11.07.C Add the following new Paragraph after Paragraph 11.07.B:

All Contract Change Orders must be concurred in by Agency before they are effective.

ARTICLE 12 – CLAIMS

NO CHANGE

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.02 Allowances

SC 13.02.C Delete Paragraph 13.02.C in its entirety and insert the following in its place:

[Deleted]

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

NO CHANGE

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

SC-15.01 Progress Payments

SC 15.01.B Amend the second sentence of Paragraph 15.01.B.1 by striking out the following text: "a bill of sale, invoice, or other."

SC 15.01.B.3 Add the following language at the end of paragraph 15.01.B.3:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

SC 15.01.B.4 Add the following new Paragraph after Paragraph 15.01.B.3:

The Application for Payment form to be used on this Project is EJCDC C-620 unless another form is agreed upon by the Engineer, Owner, and Agency. The Agency must approve all Applications for Payment before payment is made.

SC 15.01.D.1 Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place:

The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due twenty (20) days after the

Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-15.02 *Contractor's Warranty of Title*

SC 15.02.A **Amend Paragraph 15.02.A by striking out the following text: "no later than seven days after the time of payment by Owner" and insert "no later than the time of payment by Owner."**

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

NO CHANGE

ARTICLE 18 – MISCELLANEOUS

SC 18.09 **Add the following new paragraph after Paragraph 18.08:**

Tribal Sovereignty. No provision of this Agreement will be construed by any of the signatories as abridging or debilitating any sovereign powers of the {insert name of Tribe} Tribe; affecting the trust-beneficiary relationship between the Secretary of the Interior, Tribe, and Indian landowner(s); or interfering with the government-to-government relationship between the United States and the Tribe.

ARTICLE 19 – FEDERAL REQUIREMENTS

SC 19 **Add Article 19 titled "FEDERAL REQUIREMENTS"**

SC 19.01 **Add the following language as Paragraph 19.01 with the title "Agency Not a Party":**

A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees is a party to this Contract.

SC 19.02 **Add the following sections after Article 19.01 with the title "Contract Approval":**

A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit F) before Owner submits the executed Contract Documents to Agency for approval.

B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

SC 19.03 **Add the following language after Article 19.02.B with the title "Conflict of Interest":**

A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the

employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

SC 19.04 Add the following language after Article 19.03.A with the title "Gratuities":

A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

B. In the event this Contract is terminated as provided in paragraph 19.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

SC 19.05 Add the following language after Article 19.04.B with the title "Audit and Access to Records":

A. Owner, Agency, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor which are pertinent to the Agreement, for the purpose of making audits, examinations, excerpts, and transcriptions. Engineer shall maintain all required records for three years after final payment is made and all other pending matters are closed.

SC 19.06 Add the following language after Article 19.05.A with the title "Small, Minority and Women's Businesses":

A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to

a subcontract to take the affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

SC 19.07 **Add the following after Article 19.06.A with the title "Anti-Kickback":**

A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

SC 19.08 **Add the following after Article 19.07.A with the title "Clean Air and Pollution Control Acts":**

A. If this Contract exceeds $100,000, compliance with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h) and 42 USC 7401et. seq.), section 508 of the Clean Water Act (33 U.S.C. 1368) and Federal Water Pollution Control Act (33 USC 1251 et seq.), Executive Order 11738, and Environmental Protection Agency regulations is required. Contractor will report violations to the Agency and the Regional Office of the EPA.

SC 19.09 **Add the following after Article 19.08 with the title "State Energy Policy":**

A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

SC 19.10 **Add the following after Article 19.09 with the title "Equal Opportunity Requirements":**

A. If this Contract exceeds $10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and 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 Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. 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 subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

SC 19.11 **Add the following after Article 19.10.C with the title "Restrictions on Lobbying":**

A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed $100,000 at any tier under a Federal loan that exceeds $150,000 or a Federal grant that exceeds $100,000. If applicable, Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. 1352. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

SC 19.12 **Add the following after Article 19.11.A with the title "Environmental Requirements":**

When constructing a Project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental conditions:

A. Wetlands –When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.

B. Floodplains –When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100-year floodplain areas (Standard Flood Hazard Area) delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, e.g., alluvial soils on NRCS Soil Survey Maps.

C. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact or human remains shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).

D. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor,

Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

E. Mitigation Measures – The following environmental mitigation measures are required on this Project: {Insert mitigation measures here}.

FORM APPROVED
OMB NO. 0575-0042

Form RD 1924-18
(Rev. 6-97)

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL DEVELOPMENT
FARM SERVICE AGENCY

PARTIAL PAYMENT ESTIMATE

CONTRACT NO.

PARTIAL PAYMENT ESTIMATE NO.

PAGE _____

OWNER: _____

CONTRACTOR: _____

PERIOD OF ESTIMATE
FROM _____ TO _____

CONTRACT CHANGE ORDER SUMMARY

No.	Agency Approval Date	Amount Additions	Amount Deductions
TOTALS		$0.00	$0.00
NET CHANGE		$0.00	$0.00

ESTIMATE

1. Original Contract _____
2. Change Orders $0.00
3. Revised Contract (1 + 2) $0.00
4. Work Completed* _____
5. Stored Materials* _____
6. Subtotal (4 + 5) $0.00
7. Retainage* _____
8. Previous Payments _____
9. Amount Due (6-7-8) $0.00

** Detailed breakdown attached*

CONTRACT TIME

Original (days) _____
Revised _____
Remaining _____

On Schedule ☐ Yes ☐ No

Starting Date _____
Projected Completion _____

CONTRACTOR'S CERTIFICATION:

The undersigned Contractor certifies that to the best of their knowledge, information and belief the work covered by this payment estimate has been completed in accordance with the contract documents, that all amounts have been paid by the contractor for work for which previous payment estimates was issued and payments received from the owner, and that current payment shown herein is now due.

Contractor _____

By _____

Date _____

APPROVED BY OWNER:

Owner _____

By _____

Date _____

ARCHITECT OR ENGINEER'S CERTIFICATION:

The undersigned certifies that the work has been carefully inspected and to the best of their knowledge and belief, the quantities shown in this estimate are correct and the work has been performed in accordance with the contract documents.

Architect or Engineer _____

By _____

Date _____

ACCEPTED BY AGENCY:

The review and acceptance of this estimate does not attest to the correctness of the quantities shown or that the work has been performed in accordance with the contract documents.

By _____

Title _____

Date _____

TYPICAL UNIT PRICE BREAKDOWN *

ITEM	DESCRIPTION	CONTRACT *(revised)*			THIS PERIOD		TOTAL TO DATE		% COM-PLETE
		QUANTITY	UNIT PRICE	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
				$0.00		$0.00		$0.00	0
	TOTALS			$0.00		$0.00		$0.00	0

TYPICAL LUMP SUM PRICE BREAKDOWN *

ITEM	DESCRIPTION	SCHEDULED VALUE	WORK COMPLETED		% COM-PLETE
			THIS PERIOD	TO DATE	
					0
					0
					0
					0
					0
					0
					0
					0
					0
					0
	TOTALS	$0.00	$0.00	$0.00	0

TYPICAL STORED MATERIALS AND RETAINAGE BREAKDOWN *

MATERIALS STORED AT END OF THIS PAYMENT PERIOD			
DESCRIPTION	QUANTITY	UNIT VALUE	AMOUNT
			$0.00
			$0.00
			$0.00
			$0.00

RETAINAGE			
	THIS ESTIMATE	PERCENT	RETAINED
WORK COMPLETED:		%	
STORED MATERIALS:			
OTHER (explain)			
TOTAL			$0.00

* As a minimum, detailed breakdowns should contain this information.

FORM APPROVED
OMB NO. 0575-0042

Form RD 1924-7
(Rev. 2-97)

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL DEVELOPMENT AND
FARM SERVICE AGENCY

CONTRACT CHANGE ORDER

ORDER NO.	
DATE	
STATE	
COUNTY	

CONTRACT FOR

OWNER

To _____
(Contractor)

You are hereby requested to comply with the following changes from the contract plans and specifications:

Description of Changes (Supplemental Plans and Specifications Attached)	DECREASE in Contract Price	INCREASE in Contract Price
0	$	$
		$0.00
		$0.00
		$0.00
		$0.00
TOTALS	$ 0.00	0.00
NET CHANGE IN CONTRACT PRICE	$ 0.00	0.00

JUSTIFICATION:

The amount of the Contract will be (Decreased) (Increased) By The Sum Of: _____

_____ Dollars ($_____).

The Contract Total Including this and previous Change Orders Will Be: _____

_____ Dollars ($ _____).

The Contract Period Provided for Completion Will Be (Increased) (Decreased) (Unchanged) : _____ Days.

This document will become a supplement to the contract and all provisions will apply hereto.

Requested _____ _____
(Owner) *(Date)*

Recommended _____ $0.00
(Owner's Architect/Engineer) *(Date)*

Accepted _____ _____
(Contractor) *(Date)*

Approved by Agency _____ _____
(Name and Title) *(Date)*

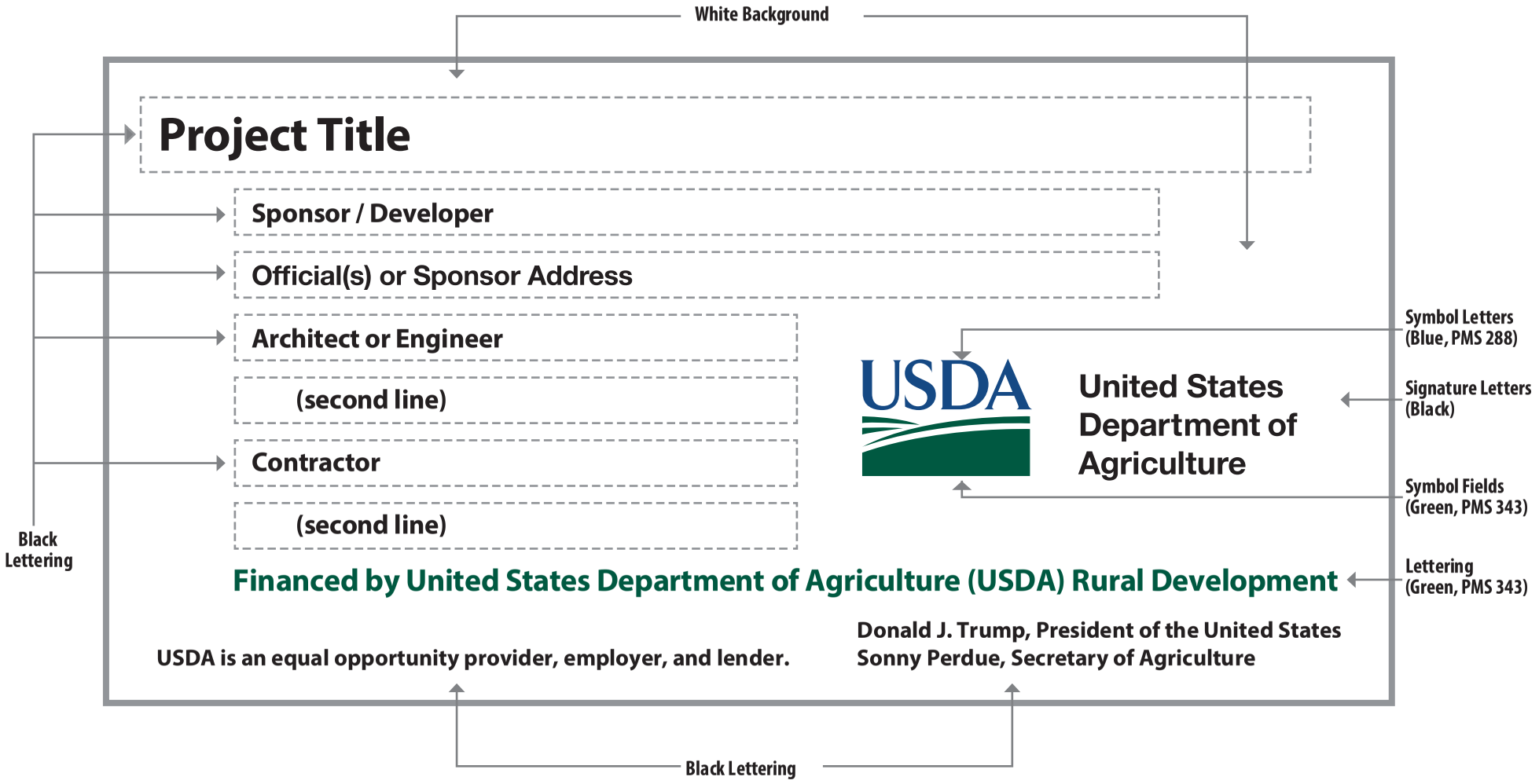
According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-01042. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

☐ ORIGINAL-BORROWER'S CASE FOLDER
☐ COPY-CONTRACTOR
☐ COPY-BORROWER

Project Sign

TEMPORARY CONSTRUCTION SIGN FOR RURAL DEVELOPMENT PROJECTS

Recommended Fonts: Helvetica, Arial, or Myriad Pro



SIGN DIMENSIONS : 1200 mm x 2400 mm x 19 mm (approx. 4′ x 8′ x ¾″)
PLYWOOD PANEL (APA RATED A-B GRADE–EXTERIOR)

SPECIAL PROVISIONS

1.0 GENERAL

This section describes the work to be done as it relates to the other sections of these specifications. The method of bidding for the various contract items is also indicated. As described in the advertisement, the project consists of 2 contracts.

1.1 WORK LIMITS

CONTRACTOR shall confine all of his construction activities within the property owned or easements obtained by the owner, unless written permission is obtained from adjacent owners. The CONTRACTOR shall provide all facilities necessary to meet his own requirements as to field office (including telephone and answering machine), toilet facilities, storage facilities, work shop, etc.

Attention is directed to the fact that several contracts may be may be awarded simultaneously. The CONTRACTOR shall consult the specifications for all the other contracts, if applicable, and the relation of those contracts to his work. The CONTRACTOR shall cooperate with the ENGINEER and the other contractors to the fullest extent, to ensure progress on the project and to avoid unnecessary delays to, or interference with, work under the other contracts.

Each CONTRACTOR shall schedule his work and construct the different parts of the system in accordance with the instructions and requirements of the ENGINEER.

1.2 USE OF EXPLOSIVES

The transportation, handling, storage and use of dynamite and other explosives shall be directed and supervised by a person of proven experience and ability in blasting operation. All blasting operations shall be in accordance with applicable local, state, and federal laws. Before any explosives are brought on the job, permission to do so shall be obtained from the ENGINEER. All blasts shall be fired electrically with an electric blasting machine. Where detonating cord is used as a detonating agent, the detonation cord shall be fired with an electric blasting cap. Delay electric detonators shall be used for all delayed blasts. Blasting machines used for firing shall be known to be in good condition and of sufficient capacity to fire all charges. Rubber covered or other adequately insulated copper wires in good condition shall be used for firing lines and shall have solid cores of appropriate gage.

Sufficient firing lines shall be provided to permit the blaster to be located at a safe distance from the blasts. Single conductor lead lines shall be used. All operations involving the handling or use of explosives shall be discontinued during approach of a thunderstorm or while it is in progress. Blasting operations in the proximity of overhead power lines, communications lines, or other structures shall not be carried on until the operator and/or owner of such lines has been notified and precautionary measures deemed necessary have been taken. All holes located on a shift shall be fired on the same shift. The use of black powder is prohibited.

2.0 DESCRIPTION OF BID ITEMS:

A. The following items are included in Contract 1:

Item 1 - This item includes the cost of all material and all the work necessary to lay and install waterline. All incidental work for a complete and workable installation shall be performed including trenching, any rock excavation, standard pipe bedding, provisions of required fittings, thrustblocking, backfilling, taping(including sleeve and taping valve), seeding, sodding, crop damage, flumes, standard stream crossings, fencing, line testing, line sterilization, tie-ins to existing lines, and all other work required, but not specifically covered by another bid item. Pipe will be measured along the centerline of the pipe from the center of the connecting fitting to the end of the pipe with no deductions for valves and fittings. Carrier pipe installations in special crossings will be included in this item. Alternate pipe materials are to be shown, however, only the amount determined by the lowest unit price shall be forwarded to the total column. All pipe bids will be classed in accordance to the ratings listing in the Bid Schedule. All fittings (tees, elbows,

etc.) shall be DIP mechanical joint.

Item 2 - Payment for gate valve assemblies includes furnishing, delivering and installing on the distribution lines, shall be made at the unit price bid and shall include the valves and fittings, thrust blocking, valve boxes, covers, extensions, and 2 valve wrenches for the project.

Item 3 - This item includes the cost of open cutting county roads and driveways and the cost of new schedule 40 steel casing pipe. The size of the carrier pipe for which casing will be required is listed. Because casing sizes vary for pipe materials of the same diameter, the CONTRACTOR should refer to the Standard Details to determine the sizes required for the pipe he intends to use. The carrier pipe will be paid for under the units bids for furnishing and laying pipe and not under this item. Payment will be based in the required open sitting length.

Item 4 - This item includes the complete installation of special creek crossings as detailed in the drawings. The crossings include casing pipe and are to extend 10 feet into each bank. The Type "A" crossing is paid per anchor bag on four foot center required. The Type "B" crossing is paid per linear foot of concrete and encasement pipe required. The carrier pipe is paid separately under Item 1.

Item 5 - This item includes the cost of installing air release valve assemblies in boxes as specified. Valves shall be installed at a local high spot as shown and detailed in the plans or by the Engineer's representative.

Item 6 - This item includes new water meter assemblies for new water service. Includes 20 ft of ¾" PE service line installation and end of line plug

Item 7 - This item includes reconnection of existing water meters from existing mains to the new main.

Item 8 - This item includes furnishing, delivery and installing flush hydrant assemblies as shown in the standard details and shall include all fittings, gate valve, thrust-blocking, excavation and backfilling as specified. Payment will be based on the unit cost for each assembly.

Item 9 - This item includes connection to existing water line by hot tap. Furnish all labor, equipment and materials and connect to existing main with tapping assembly with valve.

Item 10- This item shall include payment for all pavement replacement. **Payment will not be based on the quantity of paving materials purchased by the CONTRACTOR**. Payment for light-duty and heavy-duty bituminous paving repair shall be based on the square yardage of paving surface as shown in the Standard Details. Payment shall include cost of laying, trenching, rolling, dense grade aggregate, bituminous paving, and any other work incidental to making the installation or maintaining traffic. Where the paving surface is crushed stone, payment will be made on a per linear foot basis, compacted in place and conforming to the dimensions shown in the Standard Details. Where line is bored under drives or roads to protect paving at CONTRACTOR'S option (i.e. no casing required and open cutting permitted) then payment will be based on the amount of pavement, which would have been replaced had open cutting been performed and line work will be paid for under Item 1.

Deductive Alternates

Item A Happy Top Pump Station

The new Nema 4X free standing aluminum control/VFD panel shall be located outside the station and under a weather guard structure as shown on the plans. The VFDs shall be Square D ATV212 series and sized to handle the service factor amps of each pump motor.

Station upgrade includes re-programming the telemetry for variable speed operation and connections to the VFD's. Programming includes any changes needed for the master control unit at the water office. It is the intent of the project to allow for remote monitoring of each pumps operating speed and a means to remotely change the operating speed. It is also the intent of the project requirements to allow for the booster station to be operate in a constant pressure mode when needed.

The existing Nema 4 RTU shall be relocated to above ground and be installed under the above mentioned weather guard structure. A cover shall be provided and installed over the existing front door mounted display so as to protect the display from the elements.

All associated control wiring required to connect the existing transducers, pressure switches, station flooding float and any other monitoring devices shall be installed from inside the pump station and to the above ground/relocated RTU. All necessary control interface/power wiring from the new pump/VFD control panel shall be installed between the RTU and the pump panel. All shielded cable as needed for analog circuits shall be installed in a separate conduit.

The existing single phase electrical service and static phase converter shall be kept in service until one of the existing 25 hp pumps is connected to a new 460 volt three VFD.

A new 3/60/460 4 wire electrical service shall be built and installed as shown on the plans. Included shall be a Nema 4X 200 amp fused disconnect and 600 volt rated double throw transfer switch, transformer and all power distribution devices.

One pump shall be kept in operation at all times during construction. The existing underground pump station panel will be used until the new pump control panel is wired, tested and connected to one of the two pumps. The existing control panel shall be modified as needed so as to allow for interface/operation of any station 115/230 volt single phase accessory circuits that are to remain. All required interconnecting wiring form the existing panel to the new panel shall be the responsibility of the contractor. The existing single phase load center shall remain and serve as a means of disconnect. Any existing duplex receptacles in the panel shall remain and be re used as needed.

Each 25 hp motor circuit shall include a new rigid steel conduit/wire run from the new above ground control panel to the top of and thru the existing steel station with termination in a Nema 4X 200 amp non fused disconnect. Flexible conduit from this disconnect to the 50 hp motors is also required.

The existing electrical service is 1/60/230 4 wire. The new electrical service is 3/60/460 4 wire

The new Nema 4 X aluminum free standing control panel shall contain a main power connection, all three phase distribution devices, two VFD's, single phase load center, APT TE series TVSS surge protection device sized and selected for the intended service, pump control interlock circuitry so as to not allow two pumps to start or run at the same time, phase/volt monitor, all necessary devices necessary to properly keep the interior of the panel at a proper operating temperature, HOA switches, run lights, door mounted speed control pads and all necessary circuitry/terminals to allow for automatic operating in conjunction with the existing PVWD Scada system.

All key pads, switches, pilot lights and pilot control devices shall be mounted on a fully hinged aluminum dead front located within the main control panel.

The pump control panel and one new pump shall be provided by a single source supplier so as to provide the owner with one source of responsibility/warranty and on site start up.

Item B Ballard Branch Pump Station

The contractor shall convert the existing underground steel constant speed booster station to VFD operation. The new Nema 4X free standing aluminum control/VFD panel shall be located outside the station and under a weather guard structure as shown on the plans. The VFDs shall be Square D ATV212 series and sized to handle the service factor amps of each pump motor.

Replace one existing J Line canned turbine pump and motor with a Grundfos CR45-7-2 vertical multistage pump and 50 hp, 3450 RPM to match the recently replaced Grundfos pump and motor.

All fabricated steel pipe, pump base and fittings shall be rated for 350 pound discharge operating pressure. All new piping as well as the previously installed steel piping shall be field painted with a two component epoxy paint. All gaskets shall be of the high pressure type with o ring and all bolts shall be grad 8 zinc chromate coated.

Both existing Bermad 740Q-03 electric check valves shall be converted to Bermad model 760-03 hydraulic check valves by re porting the valve double chamber, removing the solenoid valves and removing the limit switches and all associated wiring to the existing control panel.

Programming includes any changes needed for the master control unit at the water office. It is the intent of the project to allow for remote monitoring of each pumps operating speed and a means to remotely change the operating speed. It is also the intent of the project requirements to allow for the booster station to be operate in a constant pressure mode when needed.

The existing Nema 4 RTU shall be relocated to above ground and be installed under the above mentioned weather guard structure. A cover shall be provided and installed over the existing front door mounted display so as to protect the display from the elements.

All associated control wiring required to connect the existing transducers, pressure switches, station flooding float and any other monitoring devices shall be installed from inside the pump station and to the above ground/relocated RTU. All necessary control interface/power wiring from the new pump/VFD control panel shall be installed between the RTU and the pump panel. All shielded cable as needed for analog circuits shall be installed in a separate conduit.

The existing fused disconnect and double throw transfer switch shall remain and be reused. No additional provisions for a generator connection are needed.

One pump shall be kept in operation at all times during construction. The existing underground pump station panel will be used until the new pump control panel is wired, tested and connected to one of the two pumps. The existing control panel shall be modified as needed so as to allow for interface/operation of any station 115/230 volt single phase accessory circuits that are to remain. All required interconnecting wiring form the existing panel to the new panel shall be the responsibility of the contractor. The existing single phase load center shall remain and serve as a means of disconnect. Any existing duplex receptacles in the panel shall remain and be re used as needed.

A 24 hour 96 pin timers shall be provided so as to allow pumping only to be done during a preset time. A switch shall be provide so as to allow the timer to be disabled.

Each 50 hp motor circuit shall include a new rigid steel conduit/wire run from the new above ground control panel to the top of and thru the existing steel station with termination in a Nema 4X 200 amp non fused disconnect. Flexible conduit from this disconnect to the 50 hp motors is also required.

The existing electrical service is 3/60/230 4 wire.

The new Nema 4 X aluminum free standing control panel shall contain a main power connection, all three phase distribution devices, two VFD's, single phase load center, APT TE series TVSS surge protection device sized and selected for the intended service, pump control interlock circuitry so as to not allow two pumps to start or run at the same time, phase/volt monitor, all necessary devices necessary to properly keep the interior of the panel at a proper operating temperature, HOA switches, run lights, door mounted speed control pads and all necessary circuitry/terminals to allow for automatic operating in conjunction with the existing PVWD Scada system.

All key pads, switches, pilot lights and pilot control devices shall be mounted on a fully hinged aluminum dead front located within the main control panel.

The pump control panel and one new pump shall be provided by a single source supplier so as to provide the owner with one source of responsibility/warranty and on site start up.

Item C Beech Fork Pump Station

This item includes furnishing, delivering, and installation of a new water booster pump station. This item shall include a built in place brick structure, 3/60/480 volt electrical service, service pole, new antenna

installation, connection to existing water lines, gate valves, all fittings required for connection, thrust-blocking, excavation, backfilling, cleanup, final grading and seeding, Two (2) 15 HP vertical in-line centrifigual pumps, pump controls, VFDs, pressure gauges, inverter duty rated motors with shaft grounding rings, breakers, electrical panels, butterfly valves, pressure switches, transducers, new Scada RTU to be completely compatible with the existing PVWD system and to include VFD remote control, provisions in the control for constant pressure operation when needed, wiring, conduit, check valves, suction diffusers, magnetic flow meter with interface to the new RTU, one (1) common 6 inch angle pattern solenoid control valve with all required control interface, wall mounted HVAC unit and any other equipment or materials necessary for a complete the pump station installation. Pump efficiency shall be no less that 82 percent. Excavation is unclassified. Payment for the station and appurtenances will be lump sum.

The new Nema 12 free standing control panel shall contain a main power connection, all three phase distribution devices, two VFD's, single phase load center, APT TE series TVSS surge protection device sized and selected for the intended service, pump control interlock circuitry so as to not allow two pumps to start or run at the same time, phase/volt monitor, all necessary devices necessary to properly keep the interior of the panel at a proper operating temperature, Pump HOA switches, control valve HOA switch, run lights, door mounted speed control pads and all necessary circuitry/terminals to allow for automatic operating in conjunction with the existing PVWD Scada system.

All key pads, switches, pilot lights and pilot control devices shall be mounted on the exterior of the panel.

The pump control panel and one new pump shall be provided by a single source supplier so as to provide the owner with one source of responsibility/warranty and on site start up.

B. The following items are included in Contract 2:

Item 1 - This item includes the cost of all material and all the work necessary to sandblast and repaint a 100,000 Gallon ground water storage tank. The work includes all site preparation, surface preparation and cleaning, control of emissions and site clean-up. All surfaces shall be cleaned in accordance with SSPC-SP 1 Solvent Cleaning. All interior surfaces shall be sand blasted to remove all dust, rust and scale, as well as all other foreign matter and shall result in a surface preparation equal to that of an SSPC-SP 10 Near White Blast Cleaned Surface. Surface profile shall be 1.5 - 2.5 mils. All exterior surfaces shall be sand blasted to remove all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter and shall be cleaned in accordance with SSPC-SP 6 Commercial Blast Cleaning. All edges shall be feathered. The painting shall be a 3 coat acrylic system on the exterior and 3 coat Epoxy finish on the interior. This item includes protection of all properties on site and adjacent to the site and cleanup of the work area to existing conditions.

Deductive Alternates A thru C - These items include the installation of tank piping mixing systems for 3 tanks. Included in this bid item is analysis of the tank operations, recommendation of equipment necessary to assure complete mixing and cycling of the tank water and all equipment, material and labor to install piping, fitting and valves and support bracing and restoration of damaged tank walls and surfaces. Contractor shall work with Owner to provide adequate service pressures to the tank service area by providing alternate storage, pump station recirculation lines or by providing assistance in setting and operating VFDs on fill stations where available.

Technical Specifications

SECTION 01005 - ADMINISTRATIVE PROVISIONS

PART 1. GENERAL

1.1 Requirements Included

A. Title of Work, and Type of Contract.

B. Work Sequence.

C. Applications for Payment

D. Coordination.

E. Field Engineering.

F. Reference Standards.

1.2 Work Covered by Contract Documents

A. Work of this Contract comprises construction of water system improvements for the Powells Valley Water District, Owner.

1.3 Contract Method

Construct the Work under a single unit price contract.

1.4 Work Sequence

A. Coordinate construction schedule and operations with Engineer.

1.5 Applications for Payment

A. Submit five copies of each application under procedures of Section 01300 on Application for Payment form supplied by the Engineer.

B. Content and Format: That specified for Schedule of Values in Section 01300.

1.6 Coordination

A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

1.7 Field Engineering

A. Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices.

B. Control datum for survey is shown on Drawings. Locate and protect control and reference points.

1.8 Reference Standards

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the Bid date except when a specific date is specified.

C. Obtain copies of standards when required by Contract Documents. Maintain copy at jobsite during progress of the specific work.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01200 - PROJECT MEETINGS

PART 1. GENERAL

1.1 Requirements Included

A. Contractor participation in pre-construction conferences, progress meetings, pre-final inspection and final inspection.

B. Contractor administration of pre-installation conferences and pre-final inspection.

1.2 Related Requirements

A. Section 01300 - Submittals: Progress Schedules.

B. Section 01300 - Submittals: Shop drawings, product data, and samples.

C. Section 01400 - Quality Control.

D. Section 01700 - Contract Close-out: Project record documents.

E. Section 01700 - Contract Close-out: Operation and maintenance data.

1.3 Pre-construction Conferences

A. Engineer will administer pre-construction conference for execution of Owner-Contractor Agreement and exchange of preliminary submittals.

1.4 Progress Meetings

A. Attend progress meetings.

B. Review of Work progress, status of progress schedule and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

1.5 Pre-installation Conferences

A. When required in individual specification Section, convene a pre-installation conference prior to commencing work of the Section.

B. Require attendance of entities directly affecting, or affected by, work of the Section.

C. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.6 Pre-final Inspection

A. When work is substantially complete, convene a pre-final inspection.

B. Require attendance of Owner, Engineer and funding agency officials.

C. Review installation, cleanup and operation of work.

D. Review record drawings, operation and maintenance materials, and other close-out documents.

1.7 Final Inspection

A. When punch list work is complete, attend a final inspection.

B. Review completion of punch list items.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01300 - SUBMITTALS

PART 1. GENERAL

1.1 Requirements Included

A. Procedures.

B. Construction Progress Schedules.

C. Shop Drawings.

D. Product Data.

E. Manufacturer's Instructions.

F. Manufacturer's Certificates.

G. Record Drawings.

1.2 Related Requirements

A. Section 01005 - Administrative Provisions: Applications for Payment.

B. Section 01400 - Quality Control: Testing laboratory reports.

C. Section 01400 - Quality Control: Manufacturers' field service reports.

D. Section 01700 - Contract Close-out: Close-out submittals.

1.3 Procedures

A. Deliver submittals to Engineer at address listed on cover of Project Manual.

B. Identify Project, Contractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification Section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Engineer review stamps.

C. Submit initial progress schedule in duplicate within 15 days after date established in Notice to Proceed. After review by Engineer revise and resubmit as required. Submit revised schedule with each second Application for Payment, reflecting changes since previous submittal.

D. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.

E. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

F. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.4 Construction Progress Schedules

A. Submit horizontal bar chart or network analysis system using the critical path method, showing complete sequence of construction by activity, identifying work of separate stages and other logically

grouped activities. Show projected percentage of completion for each item of Work as of time of each Application for Progress Payment.

B. Show submittal dates required for shop drawings, product data, and samples, and product delivery dates.

1.5 Shop Drawings

A. Submit the number of copies which Contractor requires, plus two copies which will be retained by Engineer.

1.6 Product Data

A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.

B. Submit the number of copies which Contractor requires, plus two copies which will be retained by Engineer.

1.7 Manufacturer's Instruction

A. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, startup, operation, maintenance, adjusting, and finishing, in quantities specified for product data.

1.8 Record Drawings

A. Maintain accurate records of any variations between the work actually provided and that shown on the Contract Drawings. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends and details as may be necessary for legibility and clear portrayal of the construction.

B. Submit one copy of all such records to the Engineer.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01400 - QUALITY CONTROL

PART 1. GENERAL

1.1 Requirements Included

A. General Quality Control.

B. Workmanship.

C. Manufacturer's Instructions.

D. Manufacturer's Certificates.

E. Manufacturers' Field Services.

1.2 Related Requirements

A. Document 00700 - General Conditions: Inspection and testing required by governing authorities.

B. Section 01005 - Administrative Provisions: Applicability of specified reference standards.

C. Section 01300 - Submittals: Submittal of Manufacturer's Instructions.

1.3 Quality Control, General

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 Workmanship

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 Manufacturer's Instructions

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6 Manufacturer's Certificates

A. When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.7 Manufacturer's Field Services

A. When specified in respective Specification Sections, require supplier or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.

B. Representative shall submit written report to Engineer listing observations and recommendations.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01420 - INSPECTION OF THE WORK

PART 1. GENERAL

1.1 The Engineer's Duties

It is not the Engineer's function to supervise or direct the manner in which the work under this Contract is carried on or conducted.

The Engineer is not responsible for construction means, methods, techniques, sequences, or procedures, nor for safety precautions and programs in connection with the work.

The Engineer will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents.

1.2 The Contractor's Duties

The Contractor shall perform no work in the absence of the Engineer or his assistants, without prior approval.

The Contractor shall use no material of any kind until it has been inspected and accepted by the Engineer.

The Contractor agrees that any method or procedure, which in the opinion of the Engineer does not achieve the required results or quality of the work specified, shall be discontinued immediately upon the order of the Engineer.

The Contractor shall remedy all materials or workmanship found at any time to be defective or not of the quality required by the Plans and Specifications, regardless of previous inspection of the materials and workmanship.

The Engineer's inspection does not relieve the Contractor from any obligation to perform the work specified, strictly in accordance with the Drawings and Specifications. Any work not so constructed shall be removed and made good by the Contractor free of all expense to the Owner.

Upon completion, the Contractor shall have Record Drawings and certified as to their completeness and correctness by the Resident Inspector and delivered to the Engineer for incorporation in the Drawings.

At Contract close-out, deliver Record Documents to the Engineer for the Owner.

Accompany submittal with transmittal letter in duplicate, containing:

Date. Project title and number. Contractor's name and address. Title and number of each Record Document. Signature of the Contractor or his authorized representative.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

Not Used.

End of Section

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1. GENERAL

1.1 Requirements Included

A. Barriers

B. Protection of Installed Work.

C. Security.

D. Water Control.

E. Cleaning During Construction.

F. Project Identification.

1.2 Related Requirements

A. Section 01005 - Administrative Provisions: Work sequence. Contractor use of premises.

B. Section 01700 - Contract Close-out: Final cleaning.

1.3 Barriers

A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways as required by governing authorities for public rights-of-way and for public access to existing building.

1.4 Protection of Installed Work

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

1.5 Cleaning During Construction

A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.

1.6 Project Identification

A. Provide Project identification sign of wood frame and exterior grade plywood construction, painted with required design and colors. List title of Project, names of Owner, Engineer, Contractor.

B. Erect on site at location established by Engineer.

1.7 Removal

A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01700 - CONTRACT CLOSE-OUT

PART 1. GENERAL

1.1 Requirements Included

A. Close-out Procedures.

B. Project Record Documents.

C. Operation and Maintenance Data.

D. Warranties and Bonds.

E. Spare Parts and Maintenance Materials.

1.2 Related Requirements

A. Document 00700 - General Conditions: Fiscal provisions, legal submittals, and other administrative requirements.

B. Section 01500 - Construction Facilities and Temporary Controls: Cleaning during construction.

1.3 Close-out Procedures

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

B. When Contractor considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

D. Engineer will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

1.4 Project Record Documents

A. Store documents separate from those used for construction.

B. Keep documents current; do not permanently conceal any work until required information has been recorded.

C. At Contract close-out, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

1.5 Operation and Maintenance Data

A. Provide data for pump station.

B. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch (216 x 279 mm) three-ring side binders with durable plastic covers.

1.6 Warranties and Bonds

A. Provide duplicate, notarized copies. Execute Contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.

B. Submit material prior to final application for payment. For equipment put into use with Owner's permission during construction, submit within 10 days after first operation. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.7 Spare Parts and Maintenance Materials

A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of Work. Coordinate with Owner, deliver to project site and obtain receipt prior to final payment.

PART 2. PRODUCTS

Not Used

PART 3. EXECUTION

Not Used

End of Section

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1. GENERAL

1.1 Work Included

The Contractor shall maintain at the site for the Owner one record copy of:

A. Drawings.

B. Specifications.

C. Addenda.

D. Change orders and other modifications to the Contract.

E. Engineer field orders or written instructions.

F. Approved shop drawings, product data and samples.

G. Field test records.

1.2 Related Requirements

A. Section 01200 - Project Meetings

B. Section 01340 - Shop Drawings, Product Data and Samples

C. Section 01500 - Construction Facilities and Temporary Controls

1.3 Recording

A. Each document shall be labeled "PROJECT RECORD" in large printed letters.

B. Record information shall be kept current with construction progress.

1.4 Submittals

A. Sketches showing the "Record" information shall be provided monthly to the Engineer and submitted with the partial pay request.

B. Upon completion, the Contractor shall certified completeness and correctnesshave of their Record Drawings and delivered them to the Engineer for incorporation in the Drawings.

C. At Contract close-out, the Contractor shall deliver Record Documents to the Engineer for the Owner.

D. The Contractor shall accompany the submittal with a transmittal letter containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each Record Document.
5. Signature of the Contractor or his authorized representative.

End of Section

SECTION 02100 - EROSION CONTROL

PART 1. GENERAL

1.1 Work Included

Submit KPDES Notice of Intent (NOI) and all follow-up information. Take responsibility for locating, furnishing, installing, and maintaining temporary sediment and erosion control best management practices for earth disturbing activity areas and developing a Best Management Practices (BMP) Plan using good engineering practices as required by the Kentucky Pollutant Discharge Eliminating System (KPDES) Permit. Make and record inspections of BMPs and areas as required by the KPDES Permit. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State or Local agencies, adhere to the more restrictive laws, rules, or regulations.

1.2 Related Work

A. Section 02110 - Site Clearing
B. Section 02200 - Earth and Rock Work
C. Section 02936 - Seeding

PART 2. PRODUCTS

Not used

PART 3. EXECUTION

As the permittee, submit the KPDES Notice of Intent (NOI) form to the Division of Water. Additionally, delegate in writing to Manager, KPDES Branch, who will have signature authority for reports. Provide the Engineer a copy of the NOI and a BMP Plan to represent and warrant compliance with the Kentucky Division of Water (KDOW) KPDES Permit, related rules, and specifications prior to starting work.

Locate, furnish, install, and maintain temporary sediment and erosion control best management practices (BMP) to represent and warrant compliance with the Clean Water Act, (33 USC Section 1251 et seq.), the 404 permit, the 401 Water Quality Certification, local government agency requirements, and other related rules and permits until the project has a formal release issued.

Provide the Engineer a copy of all weekly and rainfall event inspections as they are completed. Ensure all reports are signed by the delegated authority. keep a current BMP Plan and all inspection records available for public inspection as required by the KPDES Permit.

These provisions survive the completion and/or termination of the contract. The following provisions must be followed:

1. Take full responsibility and make all corrections when a governmental agency or a local governmental authority finds a violation of the above noted requirements; that the BMPs are incomplete; that the BMP Plan is incomplete; or that the implementation of the BMP Plan is not being performed correctly or completely.

2. Make payment to the Owner for the full amount, within 10 Calendar Days of notification, when a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements; the BMPs being incomplete; or the BMP Plan being incomplete or its implementation not being performed correctly or completely. The Owner may withhold the amount of money requested for the above from the next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.

3. Indemnify and hold harmless the Department, and reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Owner may withhold the amount of any assessments, damage judgments or finding, fine, penalty or expense from the next pay estimate.

4. The Owner will find the Contract in default if a governmental agency or a local governmental authority furnishes a stop work order for any of the following: a violation of the above noted requirements, that the BMPs are incomplete, that the BMP Plan is incomplete, that the implementation of the BMP Plan is not being performed correctly or completely.

5. When the Owner or any government regulatory agency finds a violation of the above noted requirements, or that the BMPs are incomplete, or that the BMP Plan is incomplete or that the implementation of the BMP Plan is not being performed correctly or completely, correct and mitigate the conditions within 48 hours of notification by the Owner or regulatory agency. Failure to correct non-compliant site conditions will result in the Owner applying a penalty of $500 per day until corrective actions are completed.

Upon completion of the project, provide the Engineer with a copy of the submitted KPDES Notice of Termination (NOT) form. Retain all records for 3 years or provide them to the Engineer for retention.

End of Section

Section 02610 - TRENCHING AND WATER LINE INSTALLATION

PART 1 - GENERAL

The CONTRACTOR shall furnish all labor, materials and equipment to install the water lines as shown on the plans and as specified herein.

The water lines may be pressure-rated plastic pipe (PVC), municipal plastic pipe (MPVC), cast iron (CI), ductile iron (DI), or river crossing pipe, all as specified hereinafter. The bid documents shall show the amounts of each type and class of pipe to be provided by the CONTRACTOR.

The OWNER will obtain all rights-of-way for operations through private property. It will also secure building permits and the permits for all pipe laid in highway rights-of-way. Any charges for inspection or other fees required will be the responsibility of the CONTRACTOR since the amounts of these are dependent upon the operation of the CONTRACTOR.

PART 2 - HAULING AND STORAGE

The CONTRACTOR shall notify the ENGINEER when pipe will be received on the job so that proper arrangements may be made for inspecting the unloading and stringing, as well as inspecting and examining the pipe materials.

The CONTRACTOR will be required to deliver all equipment and other materials and place same as and where required for installation. Care must be exercised in the handling of all materials and equipment and the CONTRACTOR will be held responsible for all breakage or damage to same caused by his workmen, agents, or appliances for handling or moving. Pipes and other castings shall in no case be thrown or dropped from cars, trucks, or wagons to the ground, but shall be lowered gently and not allowed to roll against or strike other castings and unyielding objects violently. Pipe and other castings may be distributed at places that will not interfere with other building operations and unloaded, or yarded and distributed as required, as the CONTRACTOR may elect.

Valves, castings, fabricated metal, reinforcing steel, etc., shall be yarded or housed in some convenient location by the CONTRACTOR and delivered on the ground as required. All equipment and materials subject to damage from the weather, dampness, changes in temperature, or exposure shall be protected by a dry, weatherproof enclosure until ready for installation or use. The cost of all hauling, handling, and storage shall be included in the prices bid for equipment and materials in place. The OWNER takes no risk or responsibility for fire, flood, theft, or damage until after the final acceptance of the work.

PART 3 - LINES AND GRADES

The location of all new pipelines are shown on the plans. The ENGINEER will assist the CONTRACTOR in marking such locations in the field. The CONTRACTOR will be required to accomplish any detailed layout, including that required for establishing the grade of the pipeline.

PART 4 - TRENCH EXCAVATION

4.01 General

The CONTRACTOR shall include in his unit price bid, all trenching necessary for installation of all pipelines as planned and specified. Trenching shall include all clearing and grubbing, including all weeds, briars, small trees, stumps, etc., encountered in the trenching. The CONTRACTOR shall dispose of any such material by burning, burial, or hauling away (or as noted on the drawings), at no extra cost to the OWNER. It shall be the CONTRACTOR's responsibility to notify the appropriate state and local air pollution control agencies when he conducts open burning of refuse. Ornamental shrubs shall be removed, protected and replanted. Trenching also includes such items as minor street, road, sidewalk, pipe and small creek crossings; cutting, moving or repairing damage to fences, poles, or gates and other surface structures regardless of whether shown on the plans.

The CONTRACTOR shall protect existing facilities against danger or damage while pipeline is being constructed and backfilled, or from damage due to settlement of this backfill. In case of damage to any existing structures, repair and restoration shall be made at once and backfill shall not be replaced until this is done. In all cases, restoration and repair shall be such that the damaged structures will be in as good condition and serve its purpose as completely as before and such restoration and repair shall be done without extra cost to the OWNER. The use of trench-digging machinery will be permitted except where its operation will cause damage to trees, buildings or existing structures above or below the ground. At such locations hand methods shall be employed to avoid damage. All excavated material shall be piled in a manner that will not endanger the work and will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provisions shall be made for street drainage.

All excavation shall be open trenches, except where the drawings call for tunneling, boring, or jacking under structures, railroads, sidewalks and roads. The construction procedure for these types of excavation is described elsewhere in these specifications.

4.02 Clearing

The CONTRACTOR shall accomplish all clearing and/or grubbing as required for the construction under this contract. Clearing and grubbing shall include the cutting and removal of trees, stumps, brush, roots, logs, fences and other loose or projecting material and natural obstructions which, in the opinion of the ENGINEER, must be removed to properly prosecute the construction and operate the facilities upon completion of construction. Trees, unless designated otherwise on the plans, shall remain and be properly protected. Ornamental shrubs, plantings, fences, walls, etc. shall be removed and replanted or replaced or protected from the construction activity. Clearing and/or grubbing shall be incidental to the various bid items and no additional compensation will be paid for same.

4.03 Trench Depth

Trenches shall be excavated to the line and grade required for the installation of pipe at the elevations indicated on the plans. The minimum depth of cover shall be 30 inches above the top of the pipe, unless shown otherwise on the plans or on the Standard Details. When the pipe is laying in or on solid rock, the minimum depth of cover shall also be 30 inches above the top of the pipe. No additional compensation will be made for extra depth where required by the plans or due to CONTRACTOR error. Excavation, except as required for exploration, shall not begin until the proposed work has been staked out. Materials which are not required for backfill and site grading shall be removed and disposed of as directed by the ENGINEER. Hauling, bedding and backfilling shall be considered incidental to the various bid items and will not be paid for directly. Excavation shall be of sufficient depth to allow the piping to be laid on the standard pipe bedding in accordance with the Article 4.7 of this section. The trenches shall be excavated to a minimum of six (6) inches below the bottom of the pipe barrel in rock. In all cases where lines are under traffic, a minimum cover of thirty-six (36) inches shall be provided. Should it be necessary to avoid existing utilities, culverts, outlets, or other structures, the water line shall be carried deeper at no additional expense to the OWNER.

Where the plans call for extra trench depth, this extra depth shall be provided at no extra cost.

4.04 Trench Width

Trench widths shall exceed the minimum width that will provide free working space, on each side of the pipe and to permit proper backfilling around the pipe as shown in the accompanying table and unless specifically authorized by the ENGINEER, shall not be excavated to wider than two (2) feet plus the nominal diameter of the pipe at the top of the trench. Before laying the pipe, the trench shall be opened far enough ahead to reveal any obstruction that may necessitate changing the line and grade of the pipe. Should the CONTRACTOR fail to accomplish this, and changes are required, they shall be at his sole expense. In rock, all ledge rocks, boulders and large stones shall be removed to provide six (6) inches of clearance on each side and below all pipe and fittings.

MINIMUM TRENCH WIDTH IN EARTH
AND PAY WIDTH FOR ROCK EXCAVATION

Size	Width	Size	Width
Up to 4" Pipe	1' - 6"	15" Pipe	2' - 8"
6" Pipe	2' - 0"	16" Pipe	3' - 0"
8" Pipe	2' - 0"	18" Pipe	3' - 0"
10" Pipe	2' - 4"	20" Pipe	3' - 2"
12" Pipe	2' - 6"	21" Pipe	3' - 4"
14" Pipe	2' - 6"	24" Pipe	3' - 8"

4.05 Shoring, Sheeting and Bracing of Excavation

Where unstable material is encountered, or where the depth of the excavation in earth exceeds five (5) feet, the sides of the trench or excavation shall be supported by substantial sheeting, bracing, or shoring. The design and installation of all sheeting, sheet piling, bracing or shoring shall be based on computations of pressure exerted by the materials to be retained. Adequate and proper shoring of all excavations will be the entire responsibility of the CONTRACTOR. The Standards of the Federal Occupational Safety and Health Act and the Kentucky Department of Labor shall be followed.

4.06 Removal of Water

The CONTRACTOR shall provide adequate removal of all water and the prevention of surface water from entering the excavation. The CONTRACTOR shall maintain dry conditions within the excavations until the backfill is placed. No additional compensation will be paid for replacement and/or stabilization of prepared excavations due to flooding and/or deterioration from extended exposure. All water pumped or drained from the excavation shall be disposed of in a suitable manner without damage to adjacent property or to other work under construction.

4.07 Bedding of Pipeline

In all cases the foundation for pipe shall be prepared so that the entire load of the backfill on top of the pipe will be carried uniformly on the barrel of the pipe. The bells of the pipe shall not carry any of the load of the backfill. The CONTRACTOR should refer to the Standard Details for pipe bedding shown in the plans. The bedding specifications shall govern the backfill from the bottom of the trench up to the centerline or spring line of the pipe.

4.7.1. Stable Earth Foundation

On all galvanized or copper lines, the CONTRACTOR may use either the "solid trench bottom method" or the "undercutting method" as shown in the Standard Details. The solid trench bottom method allows support of the pipe barrel by the trench bottom with holes dug out for the bells. The bottom must be leveled with soil and free of irregularities. The undercutting method calls for 4 inches of excavation below the barrel and then refill with evenly spread earth cushion or other standard bedding.

On all PVC pipelines, the trench bottoms shall be smooth and free of frozen material, dirt clods and stones over ½" diameter. Bottom dirt left by trenching equipment will usually provide adequate material to level the trench bottom and provide bedding support for the pipe barrel. If the trench bottom is free of dirt, soft material may be shoveled off the side walls or shoveled under the pipe to ensure proper pipe barrel bedding. In areas where the trench bottom is hard, a layer of soft backfill must be provided to ensure the pipe barrel is properly cushioned. See the plans for proper bedding material depth.

If the foundation is good firm earth the pipe may be laid directly on the undisturbed earth provided the pipe

barrel is supported for its full length.

Bedding No. 9 stone, fine gravel, sand or compacted finely graded select earth shall be used to correct irregularities in the subgrade. Where bell and spigot is involved, bell holes shall be excavated to prevent the bells from being supported or undisturbed earth.

As an alternative to the above method, excavation in earth may be undercut to a depth below the required invert elevation that will permit laying the pipe on a bed of granular material or finely graded select earth to provide continuous support for the pipe barrel. Bedding depth shall be as shown on the plans.

All cast iron or ductile iron lines 4 inches above in size will be installed using the undercutting method and a crushed stone bedding in accordance with the Standard Details. The crushed stone bedding is not a separate pay item and shall be included as incidental expense in the unit price for the pipe bid per foot of pipe. Cast iron or ductile iron lines less than 4 inches may be installed using the undercutting method and earth refill.

4.7.2. Trenches in Rock

All installation in rock will utilize the undercutting method. Bedding will be with 6 inches crushed stone as shown in the Standard Details. The only exception to this will be with PVC, copper, or galvanized iron pipe 4 inches in diameter or smaller. These may be bedded on 6 inches of evenly spread earth backfill.

4.7.3. Unstable Trenches

If unstable material is encountered which may not provide a suitable foundation for the pipe, the unstable material will be removed and an adequate layer of encasement concrete or other special bedding shall be placed for the pipe foundation in accordance with the Standard Details in the plans. Such "special pipe foundation" shall only be installed if directed by the ENGINEER in writing or on the plans. This special pipe foundation shall be considered a pay item and shall be paid for by lineal foot at the contract price for the type of bedding required.

4.7.4. Smooth Trench Beds

In installations where a smooth trench bed on grade with no irregularities is required, the CONTRACTOR shall use a notched wood plank or similar device to check the bed before each length of pipe is laid. Plank shall be at least 4 feet longer than the laying length of pipe being installed.

4.08 Pavement Removal

Pavement removal shall be as indicated on the plans or directed by the ENGINEER. When so required, or when directed by the ENGINEER, only one-half (½) of the street crossings or road crossings shall be excavated before placing temporary bridges over the side excavated, for the convenience of the traveling public. All backfilled ditches shall be maintained in such a manner that they will offer no hazard to the passage of traffic. The convenience of the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridged at the direction of the ENGINEER. Pavement replacement shall be in accordance with Section AC of these specifications. Excavated materials shall be disposed of so as to cause the least interference and in every case the disposition of excavated materials shall be satisfactory to the ENGINEER.

4.09 Traffic Maintenance

The CONTRACTOR must "red light" and guard all open trenches or obstructions placed on the streets or sidewalks. The lights must be burning from sunset to sunrise in order to effectively warn and safeguard the public against dangers connected with open trenches, excavations and other obstructions. The CONTRACTOR shall be held responsible for any damage that may occur to persons or property by reason of the failure of the CONTRACTOR to properly "red light" and guard all open trenches or obstructions along the routes of the water lines. The CONTRACTOR at his own expense shall also maintain warning signs, barricades and a watchmen or flagmen to control traffic at such times as his work would interfere with the flow of traffic. No excavation shall begin that may present a safety hazard unless the signs, barricades, lights, etc. are available to protect the open excavation at the conclusion of the day. The CONTRACTOR will comply with all Federal and State Occupational Safety and Health requirements for this type of construction. The CONTRACTOR shall also comply with all local and Kentucky Department of Highways requirements for signing and traffic control.

4.10 Solid Rock Excavation

The method for payment for solid rock excavation is provided in the Bid. Rock excavation and trenching in earth may be combined into a single "unclassified" bid and no extra payment for rock shall be made in this case. Where provision is made for extra compensation solid rock excavation is defined as the removal of materials of one-half (½) cubic yard or more in one location through the use of explosives. Boulders which can be moved economically without explosives; decomposed, shattered, or weathered rock; pavement; and shale rock will not be included when rock excavation is encountered. The CONTRACTOR shall notify the ENGINEER for the purpose of obtaining an accurate survey of rock excavation required before blasting is done. No payment will be made for rock excavation which is not inspected by the ENGINEER. Whenever blasting is necessary, ample precautions shall be taken to prevent accidents to life and property from flying rock or debris by either covering the trench or excavating with heavy timbers, or mats or by using other suitable means. The CONTRACTOR should refer to the blasting requirements contained in Section AC of these specifications. Any damages to pipelines of this or other contractors or to any structures caused by blasting done under this contract shall be repaired promptly by the CONTRACTOR at his expense and to the satisfaction of the ENGINEER.

4.10.1. Where applicable, the basis for payment for rock excavation shall be computed by multiplying the average depth of rock strata by the length of strata and by the width of trench used. The maximum allowable pay width of trench is determined from Paragraph 4.4 of these specifications. Measurements of strata depth will be from top of strata to six (6) inches below the bottom of pipe barrel when the pipe is laid in accordance with these specifications. Rock excavations below the minimum grades, unless authorized by the ENGINEER, will be at the CONTRACTOR's expense. The depth measurements will be taken at each end of the strata and at 25 foot intervals. The length of the strata will be the distance between intersections of the bottom of the trench with each end of the strata.

4.10.2. Unclassified excavation by trenching includes removal of all rocks, earth, boulders, masonry, hidden concrete, etc. There will be no extra payment for rock excavation in pipeline trenches of any kind where unclassified excavation is specified. All excavation costs shall be included in the unit price for the contract.

4.11 Maintenance of Flow of Drains and Sewers

Adequate provision shall be made for the flow of sewers, drains and water courses encountered during construction. Any structures which are disturbed shall be satisfactorily restored by the CONTRACTOR.

4.12 Interruption of Utility Services

No valve, switch or other control on any existing utility system shall be operated for any purpose by the CONTRACTOR without approval of the ENGINEER and the Utility. All consumers affected by such operations shall be notified by the CONTRACTOR as directed by the ENGINEER and utility before the operation and advised of the probable time when service will be restored.

4.13 Fencing

Where water supply line is being constructed in fields where stock is being grazed, CONTRACTOR shall provide temporary fence as approved by the ENGINEER around open trenches to prevent stock from falling in trenches. Where trenching operations should isolate grazing stock from their source of water, CONTRACTOR will either provide temporary bridging over trench or else provide water for such stock.

Where trench crosses near sound existing corner posts and existing fence is in good condition, fence may be taken loose, rolled back and stored until pipeline is completed at this point, then replaced by stretching tightly and thoroughly stapling. Additional posts will be provided and additional new fence shall be provided when it is necessary to place the fence crossed by the water line in a condition equal to existing fence before water line was constructed.

Where it is necessary to cut existing fence, new end posts shall be installed on each side of the water line and the old fence thoroughly stapled to these new posts before cutting. After pipeline is completed at this point, a new fence of galvanized wire (No. 9 gauge with No. 11 filler wires) shall be stretched between these new end posts and thoroughly stapled to existing posts and any new intermediate posts necessary to provide a good fence. Replacement of fences shall be on a replacement in-kind basis, and shall be considered incidental to laying of the lines and any additional cost shall be included in the unit price bid per lineal foot of pipe.

PART 5 - PIPE AND FITTINGS

5.01 Polyvinyl Chloride Rigid Pipe and Fittings

This specification cover rigid, pressure-rated, polyvinyl chloride pipe and fittings, hereinafter called PVC pipe and PVC fittings, for sizes ½ inch through 12 inch.

5.1.1. PVC Pipe

PVC pipe shall be extruded from Type 1, Grade 1, polyvinyl chloride material with a hydrostatic design stress of 2000 PSI for water at 73.4 degrees Fahrenheit, designated as PVC 1120, meeting ASTM Specifications D-1784 for material and D-2241 for pipe, latest revisions. Pipe shall also meet all applicable provisions of the Product Standards and shall bear the National Sanitation Foundation (NSF) seal of approval in compliance with NSF Standard No. 14. PVC pipe having a maximum hydrostatic working pressure of 160 psi (SDR26), 200 psi (SDR21), 250 psi (SDR17), or 315 psi (SDR13.5) shall be used as shown in the Bid Documents and Plans.

Samples of pipe and physical and chemical data sheets shall be submitted to the ENGINEER for review and determination of compliance with these specifications before pipe is delivered to job. The pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects.

The workmanship, pipe dimensions and tolerances, outside diameters, wall thickness, eccentricity, sustained pressures (ASTM D-1598), burst pressures (ASTM D-1599), flattening, extrusion quality (ASTM D-2152), marking and all other requirements of the Product Standard PS 22-70 shall be conformed with in all respects. No pipe 2 inches in diameter or larger with a wall thickness less than 0.090 inches may be used.

Pipe shall be furnished in 20 foot or 40 foot lengths. The pipe may be double plain end or with bell on one end. Male ends of pipe must be beveled on the outside. Pipe shall have a ring painted around the male end or ends in such a manner as to allow field checking of setting depth of pipe in the socket. This requirement is made to assist construction superintendents and inspectors in visual inspection of pipe installation.

Pipe must be delivered to job site by means which will adequately support it, and not subject it to undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical. Pipe must not be exposed to the direct rays of the sun for an extended period of time. If pipe is not to be installed shortly after delivery to the job site, it stored in a shaded location and strung as needed.

5.1.2. PVC Pipe Jointing

Pipe shall be joined with slip-type joints with rubber gaskets. Pipes with bells shall have all part of the bell, including the gasket groove, made from the same extruded piece, integral with the pipe, and shall be thickened to meet standard dimension ratios of wall thickness to outside diameter. The gasket groove shall be constructed such that gasket roll-out will not occur. Rubber gasket shall conform to ASTM 1869. The pipe manufacturer shall have an experienced representative on the job for a minimum of one day at the commencement of joining and laying operations. Joint lubricant shall be of a type recommended by the manufacturer for their pipe subject to the ENGINEER's approval. Lubricant shall be water soluble, non-toxic and have no objectionable properties.

5.1.3. PVC Couplings

Where PVC couplings are used, they shall be of the same material as the pipe and may be of the molded, or extruded type. PVC couplings shall have a minimum rating of 200 psi for continuous operation at 73.4 degrees F. Ductile iron fittings are required for Class 250 PVC installations.

5.1.4. Fittings

5.1.4a. Cast Iron

Cast or ductile iron mechanical joint type fittings with appropriate adapters may be used with PVC pipe. All such fittings shall be approved by the pipe manufacturer, and complete data sent to the ENGINEER, including the manufacturer's approval, for review. Fittings shall comply with AWWA C-110 or C-111 and shall be manufactured for the size and pressure class of the line on which they are used. Use of transition gaskets will not be allowed unless specifically approved by the pipe manufacturer.

5.1.4b Payment

The cost of fittings, rings and all associated connecting costs for all fittings shown on the plans shall be included in the unit cost per foot of pipe. Payment for extra PVC or cast iron fittings not shown on the plans but requested or approved by the ENGINEER shall be at fitting cost plus $4.00 per inch of largest nominal fitting diameter.

5.1.5. Service Connections

All service connections on PVC lines shall be made by means of tees, factory tapped couplings, or bronze service clamps manufactured specifically for use with PVC pipe, with Mueller threads, Mueller Catalog No. H-134 or approved equal. Whenever possible, corporation stops shall be installed in plastic lines before conducting hydrostatic tests. Service lines shall have the same pressure rating as its main line. The specifications for Copper and PVC service lines are contained else where in this section.

5.02 Municipal Polyvinyl Chloride (MPVC) Pressure Pipe

This specification covers the requirements for AWWA approved Polyvinyl Chloride Pressure Pipe for water supply and distribution systems.

5.2.1. MPVC Pipe

MPVC pipe shall meet the requirements of AWWA C900-75, latest revision, "Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4" through 12" for Water" and shall be furnished in cast iron pipe equivalent outside diameters with rubber-gasketed separate couplings.

MPVC pipe and couplings shall be made from Class 12454-A or Class 12454-B virgin compounds as defined in ASTM D-1784. The standard code designation shall be PVC 1120. The PVC compounds shall be tested and certified as suitable for potable water products by the NSF Testing Laboratory and shall carry the NSF approval marking.

Solvent-cement couplings or joints shall not be used. PVC joints using elastomeric gaskets shall be tested as assembled joints and shall meet the laboratory performance requirements specified in ASTM D-3139.

Pipe and couplings shall be pressure Class 100, DR 25 (Dimension Ratio), pressure Class 150, DR 18, or pressure Class 200, DR 14 as shown on the plans or the bid form.

Pipe and couplings shall be marked as follows:

a. Nominal size and OD base.
b. Material code designation (PVC 1120).
c. Dimension ratio number.
d. AWWA pressure class.
e. AWWA designation number (AWWA C900).
f. Manufacturers name or trade-mark and production record code.
g. Seal of the NSF Laboratory.

Pipe and couplings shall meet or exceed the following test requirements:

Sustained Pressure DR	ASTM D-1598 (1000 Hrs.) Sustained Pressure
14	650 psi
18	500 psi
25	350 psi

Burst Pressure DR	ASTM-1599 (60-70 seconds) Minimum Burst Pressure
14	985 psi
18	755 psi

Hydrostatic Integrity - Each standard and random length of pipe shall be proof-tested at four times its rated class pressure for a minimum of 5 seconds. Bells or couplings shall be tested with pipe.

Flattening - The pipe shall not split, crack, or break when tested by the parallel-plate method as specified by ASTM D-2241.

Extrusion quality - The pipe shall not flake or disintegrate when tested by the acetone-immersion method as specified in ASTM D-2241.

Standard length - Pipe shall be furnished in standard laying lengths of 20 ft. + 1 in. A maximum of 15 percent of each pipe size may be furnished in random lengths of not less than 10 feet each.

5.2.2. MPVC Pipe Jointing

Pipe shall be joined with slip-type joints with rubber gaskets. Procedures shall be as recommended by the manufacturer and as described for PVC pipe in this section.

5.2.3. Fittings

Fittings for municipal PVC shall be cast-iron or ductile iron only. Either mechanical joints may be used. Fittings shall be manufactured for the size and pressure class of the line on which they are used and shall comply with AWWA C-110 or C-111.

5.2.4. Service Connections

Service connections shall be made by means of bronze service clamps manufactured specifically for use

with municipal PVC pipe. Clamps shall be Mueller Catalog No. 11-161 or approved equal.

5.03 Cast Iron Pipe

These specifications cover cast iron pipe 3 inch diameter and greater to be used in water transmission systems with mechanical joints, rubber ring slip type joints or flanged joints.

5.3.1. General - Gray cast iron pipe shall be designed in accordance with AWWA HI, (ASA A21.1) and for pressures and conditions as stated in these specifications.

Cast iron pipe shall be centrifugally cast and conform to AWWA C-106 for metal molds and C-108 for sand-lined molds. Mechanical joints shall conform to AWWA Specification C-111 (ASA A21.11.)

5.3.2. Metal Design Strength-

Minimum Bursting Tensile	21,000 psi
Minimum Modulus of Rupture	45,000 psi
Maximum Modulus of Elasticity	10 million psi

5.3.3. Minimum Nominal Thickness

The specific wall thickness will be determined for the given internal and external loading requirements in accordance with ASA Specification A21.1 (AWWA H1). The class of pipe required will be shown on the plans and/or bid documents. All pipe used for potable water service shall be cement-lined.

5.3.4. Lengths

Pipe may be furnished in 12, 16, 16 ½. 18 or 20 feet nominal laying lengths.

5.3.5. Tests

Hydrostatic and acceptance tests shall be in accordance with AWWA Specification C-106 for "Cast Iron Pipe Centrifugally Cast in Metal Molds" or C-108 for sand molds. The ENGINEER shall be provided with five (5) copies of each of the following tests for each contract involved:

a. Talbot strip test.
b. Ring and full length bursting tests.
c. Chemical analysis of pipe.
d. Certification that pipe was hydrostatically tested.

Any pipe not meeting the AWWA Specifications quoted above shall be rejected in accordance with the procedure outlined in the particular specification.

5.3.6. Marking

The net weight, class or nominal thickness and sampling period shall be marked on each pipe.

5.3.7. Pipe Joints for Gray Iron Pipe

Pipe joints shall be mechanical joint, rubber ring slip joint, flanged, or locked mechanical joint as specified in Section IX.

Mechanical joints are to be furnished according to AWWA Specifications C-III. All pipe joints must be furnished complete with all accessories. Mechanical joint bolts and nuts shall be of alloy cast iron or alloy steel (Corten type such as U.S. Alloy) or approved equal. Rubber gaskets shall be made of plain first grade rubber, free of imperfections and porosity. Hardness shall be 70 to 75 durometer.

Rubber ring slip joints shall be equal to AWWA C-111-64 or latest revision. The joints shall be of the following materials:

5.3.7a. Rubber ring gasket compressed in groove in bell of pipe.

5.3.7b Beveled spigot end of pipe for initial centering into rubber gasket in bell.

Locked mechanical joints shall be equal to Clow Corporation's "Locked Mechanical Joint".
All items used for jointing pipe shall be furnished with the pipe and tested before shipment. The joints shall be made with tools and lubricant in strict conformity with the manufacturer's instructions. Three (3) copies of such instruction shall be delivered to the ENGINEER at start of construction.

5.3.8. Lining and Coating Gray Iron Pipe

All cast iron pipe for water service shall be bituminous coated outside and cement lined with seal coat on the inside per the above specifications. Cement mortar lining and bituminous seal coat inside shall conform to ANSI 21.4.-64 (AWWA C-104-71).

5.3.9. Mechanical Joint, Rubber Ring Slip and Flanged Joints Fittings

Cast iron mechanical, rubber ring slip and flanged joints shall conform to ASA Specifications A21.10 (AWWA C-110) for centrifugally cast iron water pipe. Mechanical joints shall also conform in all respects to ASA 21.11 (AWWA C-111). Fittings shall be manufactured for the size and pressure class of the pipeline in which they are to be used. Fittings shall be bituminous coated outside and lined on the inside same as the line on which they are installed.

5.3.10. Cast Iron Flanged Pipe and Special Coupling

5.3.10a. Flanged Pipe

All cast iron flanged pipe shall have flanges faced and drilled, 125 pound in accordance with ASA A21.10 (AWWA C- 110) unless otherwise specified. Flanges may be cast integrally with the pipe or they may be screwed on specially designed long hub flanges, refaced across both face of flange and end of pipe. Flanged pipe shall be in accordance with ASA A21.6 (AWWA C-106) Specifications, latest revisions, and be the class called for on the plans or bid forms. Where plain ends of flanged and plain end pipe fit into mechanical joint bells, centrifugally cast pipe shall be used. Flanged pipe for water service shall be cement lined and bituminous coated the same as written herein for bell-joint pipe.

5.3.10b. Special Coupling

Flexible couplings for flanged pipe shall be a mechanical joint cast to a special flanged joint using a neoprene O-ring in place of the usual 1/16 inch rubber ring gasket. The mechanical bell and special flanged joint piece shall be of high grade gray cast iron (ASTM A48-56), AWWA C-100-54T) with bolt circle, bolt size and spacing or ASA Specifications. Mechanical joint follower flange shall be of ductile iron ASTM A399 or malleable iron ASTM A47, Grade 35018 or 32510, latest revision, with high strength/weight ratio design.

Bolts shall be fine grained high tensile malleable iron with malleable iron hexagon nut. Stainless steel nuts shall be used in vaults and wet wells. Where pressures may exceed 20 pounds, anchor studs shall be included with spigots of pipes connected drilled to receive ends of studs.

5.4 Ductile Iron Pipe

These specifications cover ductile iron pipe (3 inch diameter and greater) to be used in water transmission systems with mechanical joints, rubber ring slip type joints or flanged joints.

5.4.1. General

Ductile iron pipe shall be designed in accordance with AWWA 113 (ASA A21.50) and for pressures and conditions as stated in these specifications or called for on the plans. Ductile cast iron pipe shall conform to AWWA C-151 (ASA A21.51).

5.4.2. Minimum Nominal Thickness

The specified thickness will be determined for the given internal and external loading requirements in accordance with ASA A21.50. The class of pipe, wall thickness, and coatings required will be shown on the plans or the bid form for all ductile iron pipe installation. Ductile iron pipe will normally be class 2 for fill depths up to 16 feet and pipe diameters up to 12 inches.

5.4.3. The requirements for cast iron pipe shall also apply to ductile iron pipe with regard to lengths, tests, marking, joints, fittings, and lining or coatings. All ductile iron pipe used for potable water service shall be cement-lined and bituminous coated as specified for cast-iron pipe.

5.05 Copper Pipe and Fittings

These specifications govern the use of copper pipe where it is required for interior or exterior use.

5.5.1. Inside, Rigid with Solder Joint Connections

Small piping inside structures shall consist of standard copper tubing for water; Type "L" for general plumbing purposes. All fittings shall be "solder joint connection" cast or wrought bronze for water service for inside diameter of pipe size given. All stops, valves, hose bibs, and unions shall be made with same joints or threaded inside pipe standard, and be of brass or copper. Use 95-5 tin-antimony solder for "solder joints".

5.5.2. Outside, Underground Tubing with Compression Joints

Small piping in the ground shall be of standard soft copper tubing for water service pipe, ASTM Specifications B-88, Type "K", with bronze fittings, stops, and valves having compression connections for flared copper tubing.

5.06 Galvanized Threaded Steel Pipe and Galvanized Threaded Malleable Fittings

Galvanized threaded steel pipe shall be equal to "National" standard galvanized pipe in strength, coating, chemical and physical properties, threads and thickness, as manufactured by the National tube Company, Pittsburgh, Pennsylvania. Fittings shall be equal to Crane's standard malleable galvanized iron fittings in case of pressure lines and Crane's cast iron threaded drainage fittings in case of drains. Cast iron pipe may be substituted for galvanized pipe where authorized by the ENGINEER.

5.07 Black Steel Pipe

Pipe for natural or bottle gas service shall be black steel pipe, Schedule 40, threaded connections for use inside buildings. It is to be coated with "Trucoat" or equal when used outside in ground.

5.08 Threaded or Welded Steel Air and Gas Pipe

Air piping shall be beveled for welding or, upon the ENGINEER's approval, be threaded and coupled. In

either case, pipe 3 inches and over shall be seamless or electric weld type. Pipe less than 3 inches may be seamless, steel butt weld, or electric weld type. All air or gas pipe installed under this contract shall comply with the latest revision of ASTM Specification A-53, Grade "B" for air, and American Petroleum Institute Standards 5 L, for gas, latest revision, as applicable to the threaded or welded joint pipe. Threaded steel pipe shall be furnished with couplings "handling tight".

5.8.1. Manufacturer's Stamp and API Monogram

Each length of pipe installed under this contract shall be stamped or marked with manufacturer's name, type of pipe, pipe length and API monogram.

5.8.2. Weights, Dimensions and Test Pressures

All piping installed under this contract shall conform to the following minimum specification:

Nominal Size, Inches	Wall Thickness, Inches	Weight Lb./Ft.	Test Pressure psi, Minimum
1	0.133	1.68	700
¼	0.140	2.27	1100
½	0.145	2.72	1100
2	0.154	3.65	1100
3	0.216	7.58	1100
4	0.237	10.79	1300
6	0.280	18.97	1300

5.09 River Crossing Pipe

River crossing pipe shall be Clow Ball Joint Pipe, or equal. Pipe shall meet all provisions of ASA Specifications A-21.6. Pipe bells and glands shall be 70-50-05 ductile iron with suitable rubber sealing gaskets.

5.10 Polyethylene Plastic Pipe

Polyethylene plastic pipe for use as service lines in water distribution systems shall have copper tube size outside diameter, meeting ASTM D-2737. Pipe shall rated for 200 PSI working pressure unless a higher rating is called for in the plans. Pipe shall meet all applicable provisions of the Commercial Standards and shall bear the National Sanitation Foundation (NSF) seal of approval. Polyethylene connections shall be made by compression fittings only.

5.11 Restrained Joint PVC

Restrained Joint PVC for use for bridge crossings in water distribution systems shall meet ASTM D-2241. Pipe shall be Class 12454B rated for 250 psi; (SDR17) unless a higher rating is called for in the plans. Pipe shall be extruded from Type 1, Grade 1 material. Pipe shall meet all applicable provisions of the Commercial Standards and shall bear the National Sanitation Foundation (NSF) seal of approval. Couplings shall consist of rubber gasketed PVC couplings with nylon splines. Coupling shall provide a locked joint which will not pull apart under pressure conditions. This is accomplished by inserting a nylon spline through the spline hole in the assembled joint which engages with the spline groove in the pipe end. Rubber rings shall meet ASTM F-477, Standard Specification for elastomeric seals (gaskets) for joining PVC pipe.

All pipe material shall be, Certainteed PVC Yelomine Pressure Pipe (IPS), tapered end with Certa-Lok coupling and two gaskets or approved equal.

PART 6 - PIPE LAYING

6.01 General

Proper instruments, tools and facilities satisfactory to the ENGINEER shall be provided and used by the CONTRACTOR for the safe and convenient prosecution of the work. Each pipe manufacturer shall have an experienced representative on the job for at least one day at the commencement of jointing and laying operations.

Before any length of pipe is placed in the trench, a careful inspection shall be made of the interior of the pipe to see that no foreign material is in the pipe. In order to properly remove any foreign materials, a swab of necessary length is to be available at all times.

All pipe shall be lowered carefully into the trench, properly aligned and properly jointed by use of suitable tools and equipment, in such manner as to prevent damage to water line materials and protective coatings and linings. Excessive scratching of the exterior surface of the pipe will be cause for rejection of the pipe.

Under no circumstances shall pipeline materials be dropped or dumped into the trench. The pipe and fittings shall also be inspected for the purpose of determining if they are sound and free from cracks. Laying of pipe shall be commenced immediately after excavation is started. Pipe shall be laid with bell ends facing in the direction of laying.

When pipe laying is not in progress, the open ends of pipe shall be closed by approved means to prevent entrance of trench water into the line. Whenever water is excluded from the interior of the pipe, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and re-laid as directed by the ENGINEER. No pipe shall be laid in water or on frozen trench bottom or whenever the trench conditions or the weather are unsuitable for such work.

If any defective pipe and fittings shall be discovered after the pipeline is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge to the OWNER. Open ends of unfinished pipelines shall be securely plugged or closed at the end of each day's work or when the line is left temporarily at any other time.

6.02 Laying Cast Iron Pipe or Ductile Iron Pipe

Cast or ductile iron bolted joint, rubber ring slip joint, and ball and socket river crossing pipe shall first be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer. Three (3) copies of instructions shall be furnished the ENGINEER and one (1) copy shall be available at all times at the site of the work. The lining inside cast iron or ductile pipe must not be damaged by handling.

All pipes must be forced and held together, or“homed” at the joints, before sealing or bolting. Pipe must be aligned as each joint is placed, so as to present as nearly true, straight lines and grades as is practical, and all curves and changes in grades must be laid in such a manner that the manufacturer's recommended maximum deflection is not exceeded at any joint.

Cutting of pipe may be done by wheeled pipe cutters or saws, or by hammer and chisel, as the CONTRACTOR may elect, but the CONTRACTOR will be held responsible for breakage or damage by careless cutting or handling.

Cast iron or ductile iron pipe four (4) inch diameter and larger, shall be laid on an evenly spread and compacted crushed stone cushion four (4) inches deep above bottom of trench uniformly supporting the pipe. Six (6) inches of crushed stone bedding shall be used in rock. When cast iron or ductile iron pipe less than four (4) inch diameter is used, granular compacted earth may be substituted for crushed stone. Sufficient space (limited to 2 feet longitudinally) shall be left out of 4 or 6 inch custom for tightening of bolts where

bolted joints are used. No pipe shall be laid resting on rock, blocking, or other unyielding objects. Jointing before placing in trench, and subsequent lowering of more than one section jointed together may be allowed, subject to the ENGINEER's approval and direction.

When using pipe with push-on joints, care must be exercised to make certain that the correct gasket is being used for the type of joint installed and that the gasket faces the proper direction. Before inserting the gasket, the groove and bell socket should be carefully cleaned of all dirt. If sand or dirt is permitted to remain in the groove, leaks may occur. Lubricant must be applied to bell socket, gasket and plain-end of pipe as required by manufacturer. Plain-end must be beveled before joint is made. Deflection required at the joint shall be obtained after the joint is made. Bell and spigot pipe with caulked joints may be used for special cases only.

Where this type of pipe is required the joints shall be made as described in this paragraph. After placing a length of pipe on the prepared grade in the trench, the yarning material shall be held around the bottom of the spigot end of the next length so that it will enter the bell of the previously laid pipe as the pipe is shoved into position. The spigot shall be centered there with earth carefully tamped under and on each side of it, excepting at the bell holes. Care shall be taken to prevent dirt from entering the joint space. Two or more joints of pipe shall be in place ahead of each joint before it is poured. Yarning material for bell and spigot joints shall be rubber rings, or treated paper rope. Joint material for bell and spigot pipe, unless otherwise shown on the drawings, shall be of the sulfur compound type "Leadite", "Mineralead", or approved equal. Jute shall not be used for joint material. Yarning material shall be thoroughly caulked into the joint to ensure centering of the spigot and within the ball and prevent loss of molten joint material into the interior of the pipe, but in no event shall a depth of less than 2-1/2 inches be left for the joint compound. Each length of material shall be such as to pass completely around the pipe and provide a lap of two inches. Joint compound shall be heated in accordance with the directions of the manufacturer, care being taken to prevent under and over heating and burning. Joints shall be run with the aid of a runner and metal pouring gate thoroughly clayed to the pipe to prevent the molten compound from breaking out of the joint. Each joint shall be run full to the top of the pouring gate in one continuous pour. Material contained in the pouring gate when it is cut free from the joint may be reused. No joint shall be run in a wet trench and no water shall be allowed to come in contact with the joint until it is thoroughly hardened. If, upon inspection by the ENGINEER, imperfect joints are disclosed, the compound shall be cut out or otherwise removed and the joint re-run.

6.03 Laying Plastic Pipe

The trench bottom must be smooth and uniform and the alignment must conform with the plans. Bedding and cover as specified herein and shown in the Standard Details is required.

To make a clean and unobstructed joint, it is necessary to wipe the ring, groove and pipe spigot free from all foreign materials at the time of assembly (welded joints will be allowed only in special cases and will be required as shown on the plans). the ring must be positioned properly in the fitting to receive the pipe by a worker who is not in contact with the lubricant. In general, the lubricant is applied to the spigot (not the ring or groove.) However, the manufacturer's instructions are to be followed in all cases. Only an approved lubricant may be used in accordance with the manufacturer's recommendations. All plastic pipe shall be joined by hand.

Where good bedding conditions are attained, PVC pipe smaller than four inches may be assembled outside the trench in longer sections (as conditions allow) and then lowered into the trench. At any time when improper bedding is discovered or the pipe is severely deflected the pipe will be removed from the trench and the condition corrected. Pipe in sizes 4 inch and above may be assembled outside the trench but must be lowered into the trench as each joint is assembled. Regardless of installation methods of couplings must be inspected after laying in trench for proper insertion and alignment. Field cuts and bevels will be allowed in accordance with the manufacturer's recommendations for these operations.

A new reference mark shall be installed before joining any field cut pipe. The same requirements for clearance from rock or other objects, thrust blocking and deflections shall apply to PVC pipe as for other pipe materials. Municipal PVC pipe of all sizes must be assembled in the trench in strict accordance with the manufacturer's requirements.

6.04 Installing Flanged or Threaded Pipe and Fittings

The CONTRACTOR shall clean off all rust and dirt and paint all threads with red lead, before assembling. This pipe shall be installed by skilled pipe men, with flanges and pipes plumb and level, showing no leakage. Unions shall be included to allow for the taking down of all runs of pipes. All valve operating devices shall be in locations and of types shown on the plans. They shall be accurately plumbed, leveled, supported and braced for smooth operation.

6.05 Installing Copper Pipe and Fittings

Exterior copper pipe shall be laid of Type K pipe, with compression fittings. Joints shall be neatly reamed and flared and joints drawn up firmly. Pipe shall have at least 30-inch cover under regrade. Joints shall be tested before backfilling and all leakage stopped.

Interior pipe shall be installed of Type L copper, with sweat joint fittings. Pipe shall be tested and all leaks stopped. Pipe shall show no dents or bends. Sweat joints shall present a neat appearance. Pipe shall be parallel to walls, floors and ceilings with unions near beginning of all runs and branches. Pipe shall be secured to walls and ceiling by clamps and hangers manufactured for the purpose. Strap hangers are not acceptable. Unions and valves shall be placed on each outlet to facilitate dismantling and shutting off.

Wherever copper pipes pass through walls or floors, they shall have wrought or cast iron sleeves, so that they may be removed. See "Standard Details" in the plans for detailed specifications on joints to walls and floors. Pipes passing through structural beams shall be placed as near as possible to bottoms of floor slabs in the center of the span. Copper pipe must be installed by an experienced plumber.

Yard hydrants must be installed by the CONTRACTOR, in locations shown on the drawings. Care shall be exercised to obtain true vertical setting with exposed portions as near uniform as practicable. In excavating for yard hydrants, a hole at least 1 foot square must be dug to a depth of at least 12 inches below grade of pipe trench. This hole must be immediately below hydrant and filled with broken stone to a depth of 18 inches from bottom of hole. The excavation below bottom of yard hydrant shall be omitted where rock is encountered and 1-1/2 cubic feet of crushed rock backfill about the base of the hydrant will be used.

There shall be installed ahead of water outlet on all plumbing and water lines 1-1/2 inches and smaller in size, an all brass gate valve and a union between the valve and outlet connection or fixture.

6.06 Thrust Blocking and Anchorage

All angles or bends in the pipeline, either vertical or horizontal, shall be braced or anchored against the tendency of movement with concrete thrust blocking per the Standard Details, or approved equivalent joint harness or anchors to the satisfaction of the ENGINEER. Where joint harness is used, all component parts shall be stainless steel. Concrete thrust blocking or joint harness materials shall be considered incidental to the expense of installing the line and shall be included in the unit price bid for the pipeline. No separate payment will be made for these items.

Thrust blocks for plastic pipe will not be attached to couplings. Where thrust blocks are used for extra fittings ordered by the ENGINEER, payment shall be made using the bid price for Class "E" concrete and the thrust block dimensions shown in the Standard Details. This payment shall cover all work required for extra thrust blocks.

6.07 Testing Pressure Lines

The CONTRACTOR will be required to test all pipelines and appurtenances with water at pressure class of pipe installed. The pipe shall be slowly filled with water, care being taken to expel all air from the pipes. If necessary, the pipe shall be tapped at high points to vent the air. Pressure at least equal to 150 PSI (or the operating pressure if higher) as measured at the point of lowest elevation shall be applied for not less than one hour and all pipes, fittings, valves, hydrants and joints shall be carefully examined for defects or leakage. Any observed leakage shall be corrected.

The pipe pressure must be held at 150 PSI for one hour before beginning the test for leakage. No pipe shall be accepted unless or until the leakage, determined by this test, is less than 10 U.S. gallons over 24 hours, per mile, per inch nominal diameter of pipe. The leakage test shall be applied to the pipe for a period of not less than 4 hours.

The test shall be made between valves as far as practical in sections of pipe approximately 1,000 to 3,000 feet in length as may be directed by the ENGINEER and shall, in general, be made within twelve working days of the completion of each section of line.

To determine the rate of leakage, the CONTRACTOR shall, as required, furnish a suitable pump, pressure gauge and water meter or other appliance for measuring the amount of water pumped. The instrument used to measure leakage shall be tested for accuracy as frequently as directed by the ENGINEER. The CONTRACTOR shall furnish all necessary labor and materials to make the test and to perform any work incidental thereto.

Where it is impractical to test between the valves, the CONTRACTOR shall as directed, at his own expense and cost, temporarily place caps and plugs on the lines and test sections of the new line.

Wherever practicable, corporations stops and service lines shall be installed before testing. If these items are installed after the main is tested, then a visual inspection of the tap and service line must be permitted while under pressure before backfilling service line.

Where any section of the main is provided with concrete reaction blocking, the hydrostatic pressure test shall not be made until at least five days have elapsed after the concrete reaction blocking was installed. If high early strength cement is used in the reaction blocking, the hydrostatic pressure test shall not be made until at least two days have elapsed.

Should there be leakage over the allowable amount, the CONTRACTOR will be required to locate and repair the leaks and retest the section. It is suggested, but not required, that the CONTRACTOR have a geophone (underground listening device) on the job at the time of testing.

If the leakage of the section of pipeline being tested is below the allowable amount, but leakage is obvious in the opinion of the ENGINEER, due to water at the surface of the ground, or by listening the leak can be heard underground with a geophone, or any other means of determining a leak, the CONTRACTOR will be required to repair these leaks.

The CONTRACTOR shall furnish a meter or suction tank, pipe test plugs and by-pass piping and make all connections for conducting the above tests. The pumping equipment used shall be centrifugal pump, or other pumping equipment which will not place shock pressures on the pipeline. Power plunger or positive displacement pumps will not be permitted for use on closed systems for any purpose.

Inspection of pipe laying shall in no way relieve the CONTRACTOR of the responsibility for stopping leakage or correcting poor workmanship.

6.08 Backfilling

Backfilling must be started as soon as practicable after pipe has been laid and joints hardened sufficiently, and jointing and alignment approved. Spading of crushed rock, sand, or mechanical tamping of earth, around pipe (as specifically required) between joints shall be the usual procedure as the laying progresses. This is in order to avoid danger or misalignment from slides, flooding or other causes. The ENGINEER shall be given a minimum of 24 hours for inspection before backfilling. The backfill shall be crushed rock, sand, or finely divided earth free from debris, organic material and stones, placed simultaneously on both sides of pipe to the same level by hand.

The backfilling of the lower part of the trench beginning at the top of the bedding, the backfill material shall be carefully and solidly tamped by hand or approved mechanical methods in 6 inch layers around the pipe and up to a point 8 inches higher than the top of the pipe. For PVC only the backfill shall be select material and may be walked-in. Walking or working on the completed pipeline, except as necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to a point one diameter higher than the top of the pipe. The filling of the trench and the tamping of the backfill shall be carried on simultaneously on both sides of the pipe in such a manner that the completed pipeline will not be disturbed and injurious side pressures do not occur.

After the above specified backfill is hand placed, rock may be used in the backfill in pieces no larger than 18 inches in any dimension and to an extent not greater than one-half (1/2) the backfill materials used. If additional earth is required, it must be obtained and placed by the CONTRACTOR. Filling with rock and earth shall proceed simultaneously, in order that all voids between rocks may be filled with earth. Above the hand placed backfill, machine backfilling may be employed without tamping, (if not contrary to specified conditions for the location) provided caution is used in quantity per dump and uniformity of level of backfilling. Backfill material must be uniformly ridged over trench and excess hauled away, with no excavated rock over 1-1/2 inch in diameter or pockets of crushed rock or gravel in top 6 inches of backfill. Ridged backfill shall be confined to the width of the trench and not allowed to overlap onto firm original earth and its height shall not be in excess of needs for replacement of settlement of backfill. All rock, including crushed rock or gravel from construction, must be removed from yards and fields. Streets, roadways and walks shall be swept to remove all earth and loose rock immediately following backfilling.

In the case of street, highway, railroad, sidewalk and driveway crossings or within any roadway paving or about manholes, valve and meter boxes, the backfill must be machine tamped in not over 4-inch layers, measured loose in accordance with the Standard Details. Where backfill is under paved driveways, streets, highways, railroads, sidewalks, paved parking areas and other areas where settlement is not allowed, crushed stone or coarse sand backfill only shall be used up to the paving surface. Crushed stone shall be Kentucky Department of Highways Standards Specification No. 78 or finer. Tunnels shall be backfilled in not over 3-inch layers, measured loose, with selected material suitable for mechanically tamping. If material suitable for tamping cannot be obtained, sand, gravel or crushed rock (No. 78) shall be blown, packed or sluiced to completely fill all void spaces.

Coarse sand backfill shall be spread in layers not over 4 inches thick and thoroughly compacted. Sand may be moistened to aid compaction.

Where local conditions permit, pavement shall not be placed until 30 days have passed since placing backfill. Crushed stone as specified for roads and parking areas and sidewalks or their bases shall be placed and compacted to the top of trench. Backfill shall be maintained easily passable to traffic at original ground level, until acceptance of project or replacement of paving or sidewalks. CONTRACTOR should refer to Section AC of these specifications for procedures to be followed in replacing pavement.

Where the final surfacing is to be crushed stone, compacted earth backfill may be used in the trench to within 6 inches of the top as shown in the Standard Details.

Railroad Company and Highway Department requirements in regard to backfilling will take precedence over the above general specification where they are involved.

Excavated materials from trenches and tunnels in excess of quantity required for trench backfill shall be disposed as shown on the plans or as directly by the ENGINEER.

The CONTRACTOR shall protect all sewer, gas, electric, telephone, water and drain pipes or conduits, power and telephone poles and guy wires from danger of damage while pipelines are being constructed and backfilled, or from danger due to settlement of the backfill.

In case of damage to any such existing structures, repair and restoration shall be made at once and backfill shall not be replaced until this is done. In all cases, restoration and repair shall be such that the damaged structure will be in as good condition and serve its purpose as completely as before uncovering and such restoration and repair shall be done without extra charge.

Before completion of contract, all backfill shall be reshaped, holes filled and surplus material hauled away, and all permanent walks, street, driveway and highway paving, and sod, replaced (if such surface replacement items are included in the contract) and reseeding performed.

The CONTRACTOR shall be responsible for clean-up, grading, seeding, sodding or otherwise restoring all areas that he disturbs within the work limits of other contractors on this project.

Any deficiency in the quantity of material for backfilling the trenches or for filling depressions caused by settlement, shall be supplied by the CONTRACTOR.

6.09 Tie-Ins to Existing Pipelines

This work shall consist of connecting new water pipes to the existing system where shown on the plans and shall include the necessary fittings, tapping sleeves, valves and necessary equipment and material required to complete the connection.

Knowledge of pipe sizes in the existing system may not be accurate, therefore, it is recommended that the CONTRACTOR check outside diameters of existing pipe and types of pipe prior to ordering the required accessories. No additional payment will be allowed for machining pipe and/or accessories when the proper size is not ordered.

Neither the OWNER nor the ENGINEER can guarantee the location of the existing lines. The CONTRACTOR shall verify the location of all existing water mains and valves pertaining to the proposed improvements before excavation is started.

The necessary regulation or operation of the valves on existing mains, to allow for the connections being made, shall be supervised by the ENGINEER. Before shutting down an existing water main or branch main for a proposed connection, prior approval for a specific time and time interval shall be obtained from the OWNER. At no time shall an existing main be shut without the OWNER's knowledge and permission.

Excavation to existing water mains shall be carefully made, care being exercised not to damage the pipe. The excavation shall not be of excessive size or depth beneath the pipe. The sides of the excavation shall be as nearly vertical as possible.

The CONTRACTOR shall be responsible for any damage to the existing system and any such damage shall be repaired to the satisfaction of the ENGINEER at the CONTRACTOR's expense.

The CONTRACTOR shall verify, by field inspection, the necessary sizes, lengths and types of fittings needed for each inter-connection. Typical connections are shown on the plans and any modifications or changes shall be subject to the approval of the ENGINEER. The exact length of the proposed water main needed for this work shall also be determined by field measurement as required. The probing required to locate existing mains is not a separate pay item.

6.10 Pipe Entering Structures

Cast iron, steel, or PVC pressure pipe, 4-inch diameter or larger, entering structure below original earth level, unsupported by original earth for a distance of more than six (6) feet, shall be supported by Class E concrete,

where depth of such support does not exceed three (3) inches in accordance with the Standard Details. All other pressure pipe entering buildings or basins below original earth level, which have more than 3 feet span between wall and original earth and having a cover of more than 24 inches of earth, or under roadway, shall be supported as shown on Standard Detail drawings, in order to prevent breakage from settlement of backfill about the structure. Concrete and reinforcing steel for such supports are to be included in the unit price of work to which it is subsidiary, and not as extra concrete. Pipe entering structures shall have flexible joint within 16 inches of exterior of structure.

6.11 Ownership of Old Materials

6.11.1 Pipe

Unless otherwise indicated, all existing pipe that is to be abandoned that interferes with construction or is easily removed shall become the property of the CONTRACTOR. All pipe that is not easily removed or not required to be removed as a result of the new construction, shall be abandoned in place by the CONTRACTOR.

6.11.2 Pipe Line Fittings and Appurtenances

All pipeline fittings, valves, hydrants and other like appurtenances that are removed as a result of a new construction shall be removed by the CONTRACTOR but shall become the property of the OWNER. All such fittings and appurtenances shall be delivered to a point by the CONTRACTOR. Said point shall be on the OWNER's property and shall be designated by the ENGINEER.

6.11.3 Other Material

All other material or items that are to be removed, demolished, or abandoned as a part of this contract shall become the property of the CONTRACTOR and shall be disposed of by him.

PART 7 - MEASUREMENT AND PAYMENT

Payment for supplying, transporting and storing pipe, trenching, standard bedding, pipe installation, thrust-blocking, testing, backfilling, disinfection, seeding, crop damage, regular stream crossings, clean-up, tie-ins to other structures and other incidental items in this section shall be made on the basis of the unit price per lineal foot for the type and size of pipe installed. Payment will include all those items not specifically covered by another proposal. Pipe will be measured along the centerline of the pipe as installed with no deduction for valves and fittings.

Extra cast iron pipe fittings used with any type of pipe material where not shown on the plans and required by the ENGINEER will be paid for on the basis of the unit price per pound. The basis of weights will be those shown by the Clow Corporation. Otherwise, fittings shall be include unit price for pipe.

Where thrust blocks are installed for extra fittings, they shall be paid for on the basis of the Class "E" concrete unit price bid and the thrust block dimensions shown in the Standard Details. All other thrust blocks shall be included in the unit price bid for pipe installed.

Rock excavation if extra payment allowed, will be paid for on a cubic yard basis in accordance with these specifications for rock which must be blasted for removal. The estimating procedure is described elsewhere in these specifications. If trenching is bid "Unclassified", payment for any and all rock excavation must be included in the CONTRACTOR's unit price bid for pipe installed.

Service lines where required between the center of main line and 4 feet from the near side of the meter setter will be paid for under the appropriate unit price for the type and size of service line required regardless of open cut road crossings or other crossings involved. Where service lines are bored or jacked with no casing or with casing a unit price bid is established.

End of Section

Section 02611 - INSTALLATION OF WATER LINE ACCESSORIES

PART 1 - GENERAL

The CONTRACTOR is to supply and install all valves, hydrants, blowoffs and other equipment at the locations shown on the plans in complete accordance with these specifications.

PART 2 - GATE VALVES (THREE INCHES AND LARGER)

2.01 Underground

All underground gate valves shall be iron body, bronze-mounted non-rising stem, tar-coated outside and suitable for working water pressures of 200 PSI. Valves shall be of standard manufacture and of the highest quality both of materials and workmanship and shall conform to the latest revision of AWWA Specification C-500. Valves shall be furnished with bell, flanged or mechanical joint end connections suitable for connection to the pipe with which they are to be used.

Underground valves shall be nut operated, unless otherwise shown on the plans. CONTRACTOR shall furnish three standard stem iron wrenches for turning nut operated valves. All underground valves which have nuts deeper than 30 inches below the top of valve box shall have extended stems with nuts located within 2 feet of valve box cap.

The valve maker is to supply the ENGINEER, through the bidder, within one week after award is made, complete catalogs or other material giving complete details and dimensions of valves and accessories. The ENGINEER's approval shall be received by manufacturer prior to shipment of materials.

2.02 Housed

Gate valves, 3" and larger, for fabricated pipe systems shall be double-disc, parallel seat-type, iron body, flanged, fully bronze mounted with O-ring seals, tar-coated outside and suitable for working water pressures of 150 PSI. Valves shall be of standard manufacture and of the highest quality both of materials and workmanship and shall conform to the latest revision of AWWA Specification C-500. Unless otherwise shown on the plans, all housed gate valves shall be O. S & Y. Unless otherwise shown on the plans, all housed valves and valves in basins shall be handwheel operated. Handwheels shall have not less than the following diameters:

Size Valves	Diameter
3"	8"
4"	10"
6"	12"
8"	14"
10"	16"
12"	18"
14"	20"
16"	22"
18"	24"

Valve stand handwheels and handwheels on extended stems, shall have the same minimum diameters as those shown for handwheels directly on valves. Extension stems for O. S & Y valves shall be non-rising, with clamp to valve handwheel and hollow shaft for rising stem of valve, with adjustable cast iron guides per

each ten (10) feet of extensions stem length. All extension stems shall be connected with suitable coupling castings for connection to and removal from valves and stands. Nuts and bolts on all extensions stem connections shall be stainless steel.

PART 3 - GATE VALVES (2-1/2" AND SMALLER)

Gate valves 2-1/2" and smaller to be installed in fabricated pipe systems shall be bronze body with handwheel. They shall have inside I.P. threads and be suitable for a minimum water working pressure of 150 PSI. Valves shall have a solid wedge gate.

Underground 2-1/2" and smaller gate valves shall be iron body, bronze mounted, double-disc, parallel seat, having bronze faces and disc rings, with wedge mechanism simple and direct. They shall be similar in all other ways to the larger valves.

PART 4 - CHECK VALVES

4.01 Mechanical

Check valves shall be swing gate type. All check valves shall be standard iron body with straightway passage of full pipe area when swing gate is open. The valve shall be of the outside lever weight-operating type with an adjustable closure rate. The valve must be tight seating and must operate without hammer or shock. The seat ring or lining must be renewable. The valve should be bronze-mounted and may contain a rubber or neoprene lining in accordance with the manufacturer recommendations.

4.02 Electric

Electric solenoid operated check valves shall be installed where shown on the plans. The check valve shall be of cast iron body and cover with all bronze or non-corrosive trim construction. The valve shall be flanged, faced and drilled to conform to 125 lb. ASA Standards. The required valve sizes are shown on the plans. The valve shall be constructed with a non-corrosive lining and a bronze piston. The pilot shall be three-way type, all bronze. The design of the valve shall be such as to prevent hammer and shock. Speed of valve closing and opening shall be adjustable. The valve shall provide full pipe line flow when open. The valve shall provide for emergency closing on electrical outage. It shall also provide manual control for opening main valve. The valve shall be as manufactured by the Golden-Anderson Valve Co., Figure No. 173-D for globe body or Figure No. 174-D for angle body.

The sequence of operation for the electric check valve shall be as follows:

A. Valve openings:
   - Pump motor starter, three-way solenoid pilot, emergency solenoid pilot simultaneously energized by control circuit.
   - Valve opens as pump reaches full speed.
   - Limit switch contacts close interlocking with motor starter circuit.

B. Valve closing:
   - Three-way solenoid pilot de-energized by control circuit.
   - Pump motor circuit and emergency solenoid pilot remain energized.
   - Valve starts to close, pump running.
   - As piston nears its seat, limit switch contacts open, de-energizing pump circuit and emergency solenoid pilot.

In the event of a power failure, the motor starter circuit solenoid operated three-way pilot and the solenoid operated two-way pilot will become de-energized simultaneously. De-energizing both pilots simultaneously will cause the main valve piston to move rapidly to its seat. The speed of emergency closing is adjustable by regulating valve. The emergency closing speed is always at a faster rate than that of the normal closing

speed.

The emergency sequence of operation would also pertain in the event of a motor under voltage, motor overload, or by depressing the emergency stop button if same is used.

PART 5 - AIR RELEASE VALVES

A valve designed to allow exhaust of small pockets of air from the water main while in use shall be installed where shown on the plans or where directed by the ENGINEER. The air release valve shall have a 3/4" iron pipe thread inlet, cast iron body construction, bronze trim, with all internal parts of stainless steel or bronze. The valve shall have an orifice size of 5/64" or greater. Valves shall be suitable for a working water pressure of 150 PSI. The air release valve shall be mounted on 3/4", Schedule 80, galvanized steel riser pipe. The riser pipe shall be connected to the water main by use of a service clamp and a corporation stop as shown in the standard details. The riser pipe shall be connected to the water main by use of a service clamp and a corporation stop as shown in the standard details. The riser shall also have a 3/4", bronze gate valve with a tee-handle, solid wedge type, inside I.P. threads, suitable for a 150 PSI working water pressure. Equipment shall be as manufactured by Mueller, Ford, Crane, Valve and Primer or approved equal.

PART 6 - VALVE BOXES

All valves (gate, air release, check, etc.) installed underground shall be installed in an approved valve box. Each gate valve shall be installed in a vertical position with a valve box. Valve boxes shall be of a cast iron, two or three-piece, slip-type consisting of a base, a center section and a top section with a covered marked "water". Where valve box is constructed in a paved area, the box shall be a screw type box. The entire assembly shall be adjustable for elevation and shall be set vertically and be properly adjusted so that the cover will be in the same plane as the finished street surface (no more than ½" above ground in yards or pastures or 2" in unsodded areas.) The assembly must provide for the required cover over the pipe at the installation site and shall rest on concrete pads as shown in the Standard Details.

Air release valves will be installed in the same type of box as is used for meters. As described in these specifications the box may be cast iron, concrete, or concrete pipe.The box must allow for adequate cover over the pipe at the installation.

Check valves installed underground will be installed in the meter box type installation using concrete pipe and a meter box cover. The installation will utilize a suitable pipe diameter to accommodate the valve and accessories in accordance with the standard details. The box must allow for adequate cover over the pipe at the installation.

PART 7 - FLUSH HYDRANTS

Flush hydrants shall be installed in accordance with the details and the specifications at locations shown on the plans or as directed by the ENGINEER. In general, flush hydrants are located at the end of mains for the purpose of clearing the main of sediment, obstacles or impure water. The CONTRACTOR should refer to the Standard Details for flush hydrant installation.

PART 8 - HYDRANTS

All fire hydrants shall be of the compression type, with cast iron body, fully bronze-mounted, suitable for working pressure of 150 pounds per square inch and shall be in accordance with the latest specifications of the AWWA and the State Inspection Bureau. Hydrants shall have two 2-1/2" hose connections and a 4-1/2" steamer connection with National Standard threads.

Hydrants shall be constructed in a manner permitting withdrawal of internal working parts without disturbing barrel or casing. Hydrants shall have dry-top design and non-rising stem and be frost-proof. Valve, when shut, shall be reasonably tight if upper portion of barrel should be broken off. Waterway of hydrants shall be not less than 6" throughout and valve opening shall be at least 5 1/4" in diameter. There shall be no chattering under any conditions of operation. Each hydrant shall be tested to a hydrostatic pressure of 300 PSI with valve in both opened and closed position. The direction of opening shall be cast in the head of the hydrant. Hydrants shall be painted with one coat of red lead and two finishing coats of Koppers Ponkote Enamel for hydrants or approved equal, color to be selected by ENGINEER.

Hydrants shall have mechanical connection directly to lines. Valves supplied with hydrants shall have mechanical joints and may be connected directly to hydrant or may be on hydrant service as shown in the Standard Details. One operating and spanner wrench shall be furnished with each hydrant with a maximum of three provided on any one project. Extensions for extra depth shall be included in the cost of hydrants. One disassembly wrench shall be supplied for the project. Concrete thrust blocking, hydrant bedding and main line tee as shown in the Standard Details are to be included in the unit price for hydrant installation.

Hydrants shall be set so that outlets are not less than 15 inches above the ground, plumb and at a distance of 18 inches from the outside of the curb. If no curb exists, hydrant is to be set four feet from the property line or as shown on the plans.

PART 9 - SPECIAL PURPOSE VALVES

Pressure reducing valves sustaining valves, surge relief valves and other automatic, special-purpose valves which are to be installed as a part of the water line contract will conform with the details shown on the plans. The valves will be installed in water proof manholes or other structures as shown in the Standard Details and as described in the "Miscellaneous Structures" section of these specifications. These valves are to be hydraulically operated and of the self-contained differential-piston type. The valve body shall be cast iron of the globe or angle type. The valve is to be bronze fitted with renewable lining and seating components. The valve shall be pilot controlled and diaphragm operated. The valve shall be air and water cushioned to prevent hammer or shock. Bronze castings shall conform to ASTM B-62 and the cast iron body and lid shall conform to ASTM A-126, Class B.

Individual meter pressure reducing valves will be installed for individual services only where shown on the plans. These valves shall be a Mueller, Model No. H-9000l, 3/4" Regulator No. 3 or approved equal, complete with a bronze strainer. Each regulator is to have an adjustable pressure range of 60-125 PSI and is to be set at 80 PSI or as shown on the plans or directed by the ENGINEER. These regulators shall be installed on the inlet side of the meter. The CONTRACTOR should note that some prefabricated meter boxes do not allow space for these regulators and a box of sufficient size must be used where they are required.

PART 10 - METERS AND SERVICES

10.1 Service Lines Not Crossing A Road

All service lines shall be 3/4" Type K Copper Tubing, PVC pipe, or polyethylene plastic pipe as specified in Section IX, using a corporation stop in accordance with the Standard Details.

10.2 Service Lines Crossing a County Road or City Street

Same as above except that in general all pipe may be jacked beneath certain paved or blacktopped city streets or county roads, unless solid rock prevents using this method in which case, the open trench method will be used. The open trench method generally will be used on all unpaved city streets, county roads and private driveways. In general, blacktopped private driveways shall also be jacked under. In all cases where lines are under traffic, a minimum cover of thirty-six (36) inches shall be provided. All backfill shall be compacted by air tampers in layers no greater than 6-inch depth. Specific instructions as to the type of crossing to be installed will be shown on the plans.

10.3 Service Lines Crossing a State Highway

Services shall be jacked or pushed under paving. Pipe under 2" shall be Type K Copper or PVC pipe. If solid rock is encountered, trench will be open-cut, pipe placed and back-filled all in accordance with current requirements of the State Highway Department or the crossing will be relocated to permit boring or jacking. Specific details will be shown on the plans. Where required on the plans or by the ENGINEER, service pipe shall be encased under highways.

Schedule 40 steel pipe shall be used as casing pipe unless otherwise indicated by the plans. Polyethylene pipe will normally be encased. Where permitted rigid PVC pipe will not be encased but soft connections with polyethylene pipe will be required on either side of the boring length.

10.4 Meters

It is the intent of these specifications to obtain water meters which are cold water rotating disc type with hermetically-sealed and magnetically-driven registers. Meters shall be first line quality of the manufacturer. The latest specifications of the AWWA shall be complied with, except in the cases of conflict with these specifications. Any type or make of meter offered must have been manufactured and marketed in the U.S. for at least five (5) years and evidence will be required to indicate the name of places where meters have established satisfactory service records of five (5) years or more. (Check Section IX for specific owner requirements.)

The main case shall be high grade waterworks bronze, with hinged, single lid cover and raised characters cast on them to indicate the direction of flow. Each meter must have a manufacturer's serial number stamped on the lid. They must have a working pressure of 150 PSI. Standard frost bottom model meters shall be furnished. Non-ferrous strainers shall be provided which fit tightly against the main case.

The measuring chamber shall be bronze alloy composition and stainless steel or monel trimmed. The chamber shall be of the two piece design, equipped with a disc made of hard rubber and as near to the specific gravity of water as possible.

The register shall be straight reading U.S. Gallon type. The register unit shall be completely encased and hermetically sealed and driven by permanent magnets. Registers shall be guaranteed by the manufacturer for a period of at least 15 years.

All meters shall measure water within 2% of a separately measured volume. Ten percent of all the meters on the project will be tested after delivery in the presence of the ENGINEER or his designated representative. Testing shall be done by means of test bench and calibrated test tanks as approved by the ENGINEER. If any meter fails this test, the ENGINEER will require that all meters will be tested. The cost of any and all such testing will be at the CONTRACTOR's expense.

Meters shall include box and cover, meter, coppersetter (including cut-off valve), four feet of pipe and corporation stop plus two foot of pipe and plug or cap on the customer's side of meter. (This latter item is to prevent the customer or his plumber from disarranging or loosening the meter after the CONTRACTOR has already set the meter in its proper position). Where the main line is in the highway right-of-way, meters shall be set as close to the right-of-way fence as practicable but no meter on the same side of the road as the main line shall be set with more than 6 feet of service line unless directed by the ENGINEER or shown on the plans. The Standard Details show the required meter setting.

Meters for regular service shall be 5/8" x 3/4" unless otherwise shown on the plans. Large service connections shall have a disc meter similar and equal to the 5/8" x 3/4" meters and shall include the tap and connection, a gate valve or corporation stop the same size as the line pipe, sufficient unions and a meter box of sufficient size to house the meter as shown in the Standard Details. Meters 2 inches and larger in size shall be compound type meters.

Meter boxes for 5/8" x 3/4" meters shall be cast iron, concrete, concrete pipe, or plastic as specified in Section IX. All meter boxes shall be a minimum of 24 inches deep and 18 inches I.D.. Cast iron meter box cover for use with 18 inch I.D. plastic, concrete or vitrified clay pipe or cylinder boxes shall be stamped with the words "WATER METER," and shall be Ford No. C32, or equal. Where individual pressure reducing valves are required, the meter box must be of adequate size to accommodate the meter setting, shut-off valve and pressure regulator as shown in the Standard Details.

Meters shall be set in a workmanlike manner with backfill neatly compacted in place. In yards, pastures and other grassed areas, top of meter box may be placed no higher than ½ inch above original ground and no lower than flush with original ground. Boxes in sidewalks or other concrete areas shall be flush with surface. In areas which have not been sodded, top of box shall be 2 inches above grade. The service line must meet the same cover requirements as the main line as described in these specifications except that the service line may raised within two (2) feet of each side of the meter installation to a depth which accommodates installation at the bottom of the meter box in accordance with the Standard Details. As shown in the Standard Details, after 2 feet from box service pipe must return to 30 inches (36 inches in traffic or 24 inches in rock). If meter box area is subject to traffic, a deeper box will be required to maintain 36 inches of cover over the service pipe.

PART 11 - TRUCK LOADING STATIONS

Truck loading stations for filling water trucks will be constructed as shown in the Standard Details at the location shown on the plans or as directed by the ENGINEER.

PART 12 - MEASUREMENT AND PAYMENT

Payment for gate valves, check valves and other special valves installed underground shall include all work necessary for a complete installation and shall include all valve stem boxes or other valve boxes and box covers. Payment will be made at the unit price bid for the type and size of valve installation. Often valves are included in the fabricated piping of a structure and separate payment will not be made unless provided in the Bid Form. Costs of those is to be included in the bid for work to which they are subsidiary.

Fire hydrants include the cost of a complete installation as shown on the plans. The cost of the main line tee will be included in the unit price bid for these items. The line between tee and hydrant gate valve shall be paid for at unit price for line work.

Meters and boxes include all items for a complete installation. These are meter, box and covers, setter, shut-off valve, six (6) feet of service line, corporation stop and the plug and adapter at the end of customers service stub. Additional service line will be paid for under a separate item.

Flush hydrants and air release valves will be paid for under their respective bid price. Excess pipe will be paid under bid price for pipe installed.

Truck loading stations, where required by the plans, shall consist of a complete installation as shown in the Standard Details and will include gate valve, meter, fire hose section, support pipe, fire hydrant, cast iron tee, connecting pipe and any crushed stone or other material incidental to the installation or construction of an approach roadway to the station. The bid price for "truck loading station" shall cover all of this work and material.

* * *

Section 02612 - SPECIAL ITEMS OF CONSTRUCTION IN WATER LINE INSTALLATION

PART 1 - General

These specifications govern special crossings, installations and construction procedures required to deal with unusual construction items or special requirements of governing agencies.

PART 2 - State Highway Crossings

In all cases, these crossings will be made in compliance with the requirements of the State Highway Department. Such requirements will normally be described by the appropriate District Highway Office. In general, unless otherwise shown on the plans or otherwise directedby the ENGINEER, the crossing of all State Highways shall be accomplished by boring under the roadway. In addition, the crossing of service lines 1-1/2 inches and greater under rigid and flexible surfaced paved roads shall be accomplished by boring and jacking a casing pipe under said roadway. In certain cases, as shown on the plans, service lines of all sizes will require casing pipe installed with the crossing.

In general, the crossing of city streets and certain county roads with main lines and the crossing of unpaved streets with main lines or service lines shall be accomplished by open trenching.

2.01 Open Trench Crossings

The trench shall be excavated to a minimum width that will allow the pipe installation. The trench walls shall be kept as nearly vertical as possible. The minimum specified cover above the pipe shall be maintained. The Standard Details section of the plans shows the requirements for open trench crossings.

The backfill in the trench under any roads, driveways, or parking areas where the open trench method is used shall be of the type shown in the Standard Details and shall be deposited and compacted in uniform layers not to exceed the depth shown in the Standard Details.

The surface of the road, driveway, or parking areas shall be replaced with the same type of material as specified under pavement replacement.

2.02 Boring and Jacking

The work is herein defined as the operations in which both the boring by auger and the jacking of the casing pipe are done mechanically and in which the diameter of the casing pipe is too small to permit hand working at the heading of the casing pipe. Two basic methods are; (1) pushing the casing pipe into the fill or earth simultaneously as the boring auger drills out the ground; and (2) drilling the hole through the fill or earth and pushing the casing or carrying pipe into the hole after the drill auger has completed the bore.

A suitable approach trench shall be opened adjacent to the slopeof the embankment, or adjacent to point of bored and jacked section as shown on the plans. The approach trench shall be long enough to accommodate the selected working room. Guide timbers or rails for keeping the casing pipe on line and grade shall be accurately set and maintained in the bottom of the approach trench and with heavy timber back-stop supports installed at the rear of the approach trench to adequately take thrust of the jacks without any movement or distortion. It is paramount to the securing of acceptable tolerance limits of workmanship in the boring and jacking operation that extreme care be taken in the setting of all guides, rails and jacks to the end that the casing pipe in final position be within the limits of acceptability for the placing and laying of the carrier pipe. The minimum cover of 36 inches under the roadway must be maintained. Additional depth may be required as shown on the plans.

In general, the diameter, thickness, style, joints and materials selected for casing pipe shall be as shown on the plans and shall be considered as "minimum" requirements, all subject to prior approval of the ENGINEER. In all cases, the approval for construction by agreement with the private company and/or

construction permit issued by the State, County, or Municipal agency will be required before construction starts.

Steel casing pipe for road and railroad crossings using the boring and jacking method shall be steel, plain end, uncoated and unwrapped, and shall be furnished in at least 18-foot lengths. Steel pipe shall meet the requirements of ASTM Specification A-120. Pipes up to and including 4 inches in diameter shall be Schedule 40. Pipe larger than 4 inches shall have a wall thickness equal or greater than 0.250 inches. The diameter of all casing pipes shall be as noted in Standard Details section of the plans.

The steel casing pipe shall be bored and/or jacked in place at the locations as shown on the plans or as directed by the ENGINEER. All joints between lengths shall be solidly welded with a smooth nonobstructive joint inside. The casing pipe may be extended beyond the boring limits by open trenching as shown in the Standard Details. This would apply when the casing is required from right-of-way or ditch line to ditch line. Open trenching at jacked or bored locations will be allowed no closer than 3 feet from edge of pavement. Sand backfilling of the annular space between the carrier pipe and the casing pipe shall be mechanically placed by suitable method when required and where shown on the plans. After the water main has been installed inside the casing pipe, inspected and tested, both ends of the casing pipe shall be sealed completely with concrete or other material as shown in the plans in a manner acceptable to the ENGINEER.

Where road crossings are made using plastic pipe or copper the location of joints under the roadway should be avoided by using lengths of adequate dimension for the crossing. This principle also applies to other types of pipe where sufficiently long lengths are available.

PART 3 - RAILROAD CROSSINGS

At all railroad crossings, cover pipe (casing) for water lines (carrier pipe) shall be jacked or pushed beneath tracks and the carrier pipe jointed and pushed through the cover pipe. Detailed drawings of railroad crossings including the length of casing and depth below track are shown in the plans. CONTRACTOR shall obtain and pay for services of a representative of the railroad to direct the CONTRACTOR's operations while on the railroad property when required by the railroad.

PART 4 - CREEK CROSSINGS

4.01 Special Creek Crossing

Where required on the plans or instructed by the ENGINEER, the CONTRACTOR shall construct a special creek crossing either Type A or B as shown in the Standard Details. Where the crossing is made in a creek which has a solid rock floor, the trench shall be cut in rock of such depth as to provide a cover all around the pipe of encasement class concrete as shown in the Standard Details. Concrete shall be thoroughly puddled in place. Where the crossing is in loose rock or unstable earth where bed movement is expected, the special crossing shall be the concrete anchor type shown in the Standard Details. Two short sections of pipe shall be used within eight (8) feet of each side of the stream crossing. Crossings shall be scheduled for construction in times of low flow, if practicable, otherwise cofferdams of sand bags or clay shall be used to divert the stream flow while crossing is made. For sharp vertical curves, short lengths of pipe shall be used as much as possible to avoid use of rigid fittings. Concrete shall not be placed under water and CONTRACTOR shall provide suitable pumps to keep water out of trench excavation during stream crossing construction. Mud and water shall not be allowed to enter the carrier pipe installation. Waterproof plugs shall be provided, if necessary, to prevent water entry. A typical stream crossing section is shown in the Standard Details.

4.02 Normal Earthen Creek Crossing

Where the stream crossing is made in earth or other beds which are stable (no casing or anchorage required), then the pipe will be laid in a narrow trench at the depth specified in the Standard Details to maintain the required cover between pipe and stream bed. Initial backfill will be mechanically compacted.

Trench backfill in any stream crossing area from one (1) foot above the top of the pipe shall consist of trench excavated rock, if available. No extra payment will be made above normal construction for this type of creek crossing.

4.03 Materials

The type of water line installed at the Crossing will be specified in the plans. Concrete encasement locations and limits for stream crossings are shown on the plans for information only. The actual limits in locations where concrete encasement shall be required shall be determined in the field by the ENGINEER. The CONTRACTOR shall notify the ENGINEER of any rock excavation encountered in the area of the stream, ditch, or other area where erosion could jeopardize the pipe cover. Upon such notification, the ENGINEER shall instruct the CONTRACTOR as to whether concrete encasement should be used and the limits therefore. Failure by the CONTRACTOR to notify the ENGINEER in the above areas may result in re-excavation for placement of concrete encasement.

PART 5 - RIVER OR LAKE CROSSINGS

Crossings in rivers or lakes where the pipe cannot be laid in a trench shall normally be made with cast iron pipe having ball and socket joints. Details for any required installations of this type including pipe required, number, size and location of anchors, and installation technique are shown in the plans.

PART 6 - BRIDGE CROSSINGS

Wherever possible bridges will not be utilized for stream crossings. However, where it is necessary for the water line to be attached to bridges, the pipe shall be securely fastened to bridge stringers or beams using supports as dimensioned and located in the plans. The carrier pipe shall be insulated with Vermiculite or other approved material to prevent freezing. Expansion joints to allow for movement of the bridge will be required as shown on the plans.

PART 7 - PIPE BEDDING

7.01 Standard Pipe Bedding

Whenever the "undercutting method" is used to bed pipe lines, the CONTRACTOR shall furnish the standard pipe bedding for the continuous support of pipe. The standard pipe bedding shall be evenly spread fine granular earth material or shall be bank run sand and gravel or dense graded aggregate and shall be placed as shown on the drawings and Standard Details in accordancewith the following pipe materials and under normal stable earth trenching conditions:

Pipe	Bedding
PVC (4 inches and smaller), copper, galvanized	earth trench bottom (leveled)
PVC (above 4 inches)	compacted earth backfill
C.I. and D.I. (less than 4 inches)	compacted earth backfill
C.I. and D.I. (4 inches diameter and above)	compacted crushed stone backfill

No substitutions for standard pipe bedding will be allowed unless approved in writing by the ENGINEER. Standard pipe bedding is not a separate pay item and is to be included in the unit price bid per foot of pipe

7.02 Special Pipe Foundation

When ordered by the ENGINEER, yielding and mucking material in subgrade shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. In such locations, a special pipe foundation shall be constructed utilizing encasement class concrete in accordance with the Standard Details. This special pipe foundation is a separate pay item. The special foundation or other special laying conditions

may be required because of soil conditions, depth, traffic or other reasons. These will be extra pay items.

7.30 Standard Concrete Encasement

Concrete encasement of pipe shall be placed as directed by the ENGINEER in accordance with the Standard Details. Concrete pipe shall be mixed sufficiently wet to permit it to flow under the pipe and to form a continuous bed. In tamping concrete, care should be taken not to disturb the grade or line of the pipe or injure the joints. Concrete placed outside the specified limits or without authorization from the ENGINEER will not be subject to payment.

Concrete for encasement is described elsewhere in these specifications. Standard concrete encasement is a separate pay item.

PART 8 - WATER LINE AND SEWER LINE SEPARATION

8.01 General

Wherever sewer lines and water lines cross, or are adjacent to, each other, special precautions shall be taken.

8.02 Parallel Water and Sewer Lines

Water lines must, if possible, be located a minimum lateral distance of 10 feet from any existing or future sewer lines measured from outside diameters. Where water lines and sewer lines must be placed in the same trench, the water line must be located on a shelf, 2 feet above and 2 feet to the side of the sewer line. Whenever this condition cannot be met, and upon direction from the ENGINEER, the water line shall be uncovered and encased with concrete per the standard encasement detail.

8.03 Crossing Water and Sewer Lines

Wherever sewer lines and water lines cross, it is desirable, if practical, that the sewer line be at least 24 inches below the water line.

Where it is not practical to provide such a separation, care shall be taken to ascertain that the existing water line or existing sewer line is in good sound condition and that no evidence of joint leakage is known in that vicinity. If any such evidence does exist, the existing line shall be exposed by the CONTRACTOR at least 10 feet each side of the new pipe crossing, carefully examined and any defects positively corrected. The OWNER will arrange for examining and correcting any defects in the existing lines, but the CONTRACTOR shall cooperate in every way possible.

When the water line must be below or less than 2 feet above the sewer line, the CONTRACTOR shall encase the water line 5 feet in each direction from the crossing as directed by the ENGINEER. This encasement should only be accomplished when directed by the ENGINEER and shall be accomplished in accordance with the details shown on the drawings. The encasement is a separate pay item.

PART 9 - NOTIFICATION OF UTILITY COMPANIES

The ENGINEER assumes no responsibility for the exact location of underground utilities and the CONTRACTOR shall locate such utilities to his own satisfaction. The CONTRACTOR shall notify the appropriate utility company for location of said utility lines in the field before excavation begins. The CONTRACTOR shall be solely liable for any damages to any utilities or private property during construction and for arranging for coordination with utility representatives.

PART 10 - BLASTING

When rock excavation is encountered, the CONTRACTOR shall notify the ENGINEER before any blasting is done. Whenever blasting is necessary, ample precautions shall be taken to prevent accidents to life and property from flying rock and debris by covering the trench or excavation with heavy timbers or mats, or by using other suitable means. Any damages caused by blasting done under this contract, shall be repaired by the CONTRACTOR at his expenses and to the satisfaction of the ENGINEER.

All blasting operations shall be conducted in strict accordance with the existing laws, ordinances and/or regulations relatives to State and/or local rock blasting and storage and use of explosives and Section 9 of the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, Inc. Any rock excavation within 15 feet of water or gas mains of any size shall be done with very light charges of explosives and the utmost care shall be used to avoid disturbing the main.

Where there are no local ordinances governing blasting and the storage of explosives, all blasting supplies shall be stored in a manner approved by the rules and regulations of the Federal and State Occupational Safety and Health Regulations.

The CONTRACTOR shall maintain and keep in full force and effect blasting insurance to protect and indemnify the OWNER and/or his agents or representatives, including the ENGINEER and his representatives, from claims and damages and shall defend all suits at law.

PART 11 - DISINFECTION OF WATER LINES

All water piping shall be thoroughly disinfected before being placed in service, by the use of chlorine or chlorine compounds in such amounts as to produce an initial concentration of at least 50 ppm and a residual of at least 25 ppm at the end of 24 hours, followed by thorough flushing. If for some reason, the initial disinfection fails to result in a 25 ppm residual, or the initial concentration does not achieve at least 50 ppm, the process shall be repeated until said 25 ppm residual is obtained after the 24 hour period. All disinfection shall be accomplished in a manner satisfactory to the ENGINEER and the State Department of Health.

All valves in the lines including check and altitude valves will be opened several times during the sterilization process.

The CONTRACTOR shall be responsible for sterilization of both water lines and water storage tanks. After sterilization, the tanks shall be drained and cleaned of all debris prior to putting the unit back in service.

PART 12 - SEEDING AND SODDING

Upon completion of the installation of the work, the CONTRACTOR shall remove all debris and surplus construction materials resulting from the work. The CONTRACTOR shall fine grade all the disturbed surfaces around the area of the work in a uniform and neat manner leaving the construction area in a condition as near as possible to the original ground line or to the lines as directed by the ENGINEER. All graded areas shall be left smooth and thickly sown with a mixture of grasses. The mixture of grasses shall

consist of one-third (1/3) Rye grass, one-third (1/3) Kentucky Fescue and one-third (1/3) Kentucky Bluegrass by weight, and shall be applied to the graded areas at a rate of not less than 1 pound of seed per one thousand square feet of area. When the final grading has been completed, the entire graded area to be seeded shall be fertilized with 12-12-12 fertilizer, applied at the rate of 6 pounds per one thousand square feet of area. After the seed and fertilizer have both been applied, the CONTRACTOR shall then lightly cover the seed by use of a drag or other approved device. The seeded area shall then be covered with straw to a depth of approximately one inch.

Where existing lawns have been disturbed, the existing sod will be removed and stored and replaced to its original position once the work is in place. If the CONTRACTOR damages or destroys the original sod, it shall be replaced with a sod having at least 60% good quality Kentucky Bluegrass, strongly rooted and free of pernicious weeds and shall be so laid that no voids occur between strips. When replacing sod, it shall be tamped or rolled immediately after it is laid and the finished surface shall be true to grade, even and equally firm at all points. Well screened top soil shall be lightly sprinkled over the sodded areas and shall be thoroughly watered. Sod damaged by the CONTRACTOR shall be replaced with new sod by the CONTRACTOR at no cost to the OWNER.

The fine grading, seeding, sodding and clean-up shall be considered as incidental expense and shall not be separate pay items.

Meadows and hay fields will require replacement in kind unless the CONTRACTOR secures a release from the property owner agreeing to no replacement or alternate replacement.

PART 13 - PAVEMENT AND OTHER STRUCTURE REPLACEMENT

The CONTRACTOR shall replace all pavement cut or disturbed, with pavement similar in all respects to existing pavement in accordance with the Standard Details and at those locations approved by the ENGINEER. Every effort shall be made to avoid cutting the pavement. In restoring pavement, new pavement is required, except that granite paving blocks, sound brick or sound asphalt paving blocks may be reused. No permanent paving shall be placed within thirty (30) days after the backfilling has been completed. All concrete and asphalt paving materials shall be in conformance with the Standard Details shown in the plans.

13.1 Classification of Pavements

1. Concrete Pavement Replacement - This pavement replacement shall be Portland cement concrete construction in accordance with the requirements shown in the Standard Details. It shall include all pavement replacement on concrete surfaced roads, concrete driveways, concrete sidewalks and concrete parking areas, both public and private.

2. Heavy-Duty Bituminous Pavement Replacement - This type of asphalt pavement replacement shall be bituminous concrete surface over concrete base in accordance with the Standard Details. This type of pavement replacement shall be used on all heavily trafficked roads having an existing pavement greater than 2", whether public or private, or in other locations as directed by the

ENGINEER.

3. Light-Duty Bituminous Pavement Replacement - This type of pavement replacement shall be bituminous concrete constructed in accordance with the Standard Details. This item shall include all light-duty bituminous concrete roadways, bituminous driveways and bituminous parking lots, both public and private.

4. Gravel Surface Replacement - This type of surface replacement shall include all graveled roadways, driveways, parking areas, or other gravel surfaced areas, both private and public. This type of surfacing may also be required as a base course for other pavement replacement.

13.2 Materials

The crushed stone backfill as noted on the drawings shall be dense graded aggregate (Class A Aggregate, Grading D) per Kentucky Department of Highways Specifications. The CONTRACTOR shall be responsible for the maintenance of the aggregate and the surface of the trenches until the pavement replacement is completed.

Portland cement concrete shall be as described in Section D of these specifications for Class "A" concrete. A set of cylinders shall be made and tested for each 25 yards of concrete placed, or fraction thereof, to supply representative sampling and testing of the concrete, upon the direction of the ENGINEER. The CONTRACTOR shall produce a broomed, or burlaped, uniformly smooth and nonskid surface, consistent with the existing pavement.

Bituminous materials and mixes shall be consistent with the recommended practice of the Asphalt Institute and it shall conform to the requirements of the Kentucky Department of Highways for prime coat and Class 1 bituminous concrete. The bituminous concrete shall consist of a binder or base course and a surface course.

13.3 Installation of Pavement Replacement

The CONTRACTOR shall cut back the surfacing adjacent to the trench for 12 inches on both sides of the trench and shall cut down the dense graded aggregate he has placed to a depth required for either type of pavement replacement. The resulting surface shall be rolled to yield a smooth, dense surface and a uniform depth.

The concrete shall be placed in accordance with standard practice, with the welded wire mesh if required in proper position and thoroughly vibrated into place. The CONTRACTOR shall produce a surface consistent with the existing pavement. The CONTRACTOR shall apply a liquid curing component, sprayed on the surface of the concrete, and shall provide adequate protection to the pavement until it has set.

For bituminous concrete, the CONTRACTOR shall clean and broom the prepared surface, then apply the prime coat at the rate of 0.20 to 0.25 gallons per square yard, with a pressure distributor or approved pressure spray method. When the prime coat has become tacky but not dry and hard, the bituminous binder course, or base course, whichever applies, shall be placed and compacted. The CONTRACTOR shall then apply the surface course. It is recommended, but not required, that the base course remain in place for approximately one week before placing the surface course. The finished course shall be compacted and the completed surface shall match the grades and slopes of the adjacent exiting surfacing and shall be free of offsets, depressions, raised places and all other irregular surfaces.

l3.4 Seasonal and Weather Limitations for Pavement Replacement

In the event the progress and scheduling of the work is such that the bituminous pavement replacement would occur in the winter months, during adverse cold weather and/or during such times the asphalt plants

are not in operation, then the final pavement replacement shall be postponed until favorable weather occurs in the spring and the asphalt plants resume normal operations. No bituminous concrete shall be laid when the temperature is below 40° F except by written permission of the ENGINEER.

Concrete pavement shall not be placed when the temperature is such that the pavement placed will freeze before it has had adequate time to set and shall be placed in conformance with the temperature conditions specified in Section D of these specifications.

The CONTRACTOR shall be responsible for replacement of pavement which he has placed which has been damaged by cold weather or freezing without additional compensation.

In the meantime, the CONTRACTOR will be required to maintain the temporary surfacing until the permanent pavement is placed. Such labor, materials and equipment as is required for temporary maintenance of the streets, roadways and driveways shall be provided at the CONTRACTOR's expense and is not a pay item. The CONTRACTOR will be required to use a cold mix asphaltic concrete as a temporary surface for trenches under heavy traffic use.

13.5 Guarantee

The one year guarantee as specified in the contract documents is also applicable to trench settlement and pavement replacement.

PART 14 - SIDEWALK REPLACEMENT

Sidewalks will be replaced if damaged by the CONTRACTOR in any way. Payment will be made for those sidewalks necessarily damaged by the line installation in accordance with the Standard Details. No sidewalks are to be replaced over a backfilled trench for at least 30 days after filling. Sidewalks damaged otherwise are to be replaced immediately at the CONTRACTOR's expense.

Materials and dimensions are to be at least equal to existing walk and are to conform with the Standard Details.

PART 15 - FINAL CLEAN-UP

The work shall not be considered as complete until the right-of-way of roads and all private property has been cleared of all rubbish and loose stone, and also all equipment, excess material and temporary structures. All property, both private and public, which has been damaged in the course of the work, shall be restored in a manner fully acceptable to the property owner. Ditches shall not be obstructed from draining nor will any rubbish or other material be left to obstruct culverts, bridges or other structures.

PART 16 - MEASUREMENT AND PAYMENT

Payment for crushed stone, black top and concrete pavement replacement will not be based on the quantities purchased by the CONTRACTOR. Payment for crushed stone will be made on the basis of that necessary to fill the trench to the dimensions shown in the Standard Details. Crushed stone sub-grade under paving shall be

included in paving price and not paid for separately. Payment for blacktop or concrete will be based on the quantities in place as shown by the limiting dimensions in the Standard Details. Any additional cost estimated by the CONTRACTOR must be included in the cost of pipe in place.

Payment for special creek crossings will be at the unit price bid per lineal foot for that item and shall include encasement pipe, crushed stone, concrete, solid rock excavation and all other work necessary for a satisfactory installation. The carrier pipe installed in the casing shall be paid separately under the unit price bid for pipe installed.

Additional costs for normal earth creek crossings shall be included in the unit price bid for pipe installation and no special payment will be made for these crossings.

Casing pipe unit price bids shall include the cost of boring or jacking under railroads and highways and shall include the cost of steel casing pipe. Carrier pipe will be paid for under the unit price bid for installing lines as described in Article 2.2 of this section. PVC shall be equal to steel for casing county crossings.

Where service pipe with no casing is pushed or bored under Federal, State, or County highways or other roads as required by the plans or directed by the ENGINEER, the cost will be paid under the bid for the appropriate type of service pipe pushed and bored. This payment will be based on the required pushing or boring length and will include all related work. Where rigid PVC service pipe is installed in this manner, the payment will include connection to polyethylene service pipe at each end of the rigid section. Length of pipe considered for payment under this bid will not be included in other pipeline quantities.

Unit price bids for special pipe bedding items are to include the cost per lineal foot of installing concrete or other special pipe bedding where required by the ENGINEER. This to be an additional cost to be added to the basic furnishing and laying unit price bid for water lines.

Sidewalk crossings when included as a bid item shall include the extra cost of boring under or the removal and disposal of existing concrete sidewalk and replacement with new construction. Unit price bid is on the square yards of sidewalk replaced basis. Width for payment for a standard trench crossing is shown in the Standard Details.

If CONTRACTOR elects to bore or jack pipe under sidewalk, extra cost shall be paid for on the basis of square yards of sidewalk which would normally have been removed by the crossing. Cost of pipe installation should not be included in sidewalk crossing bid. When sidewalk crossings or replacement are not included as a bid item their costs shall be considered subsidiary to the bid for pipe installation.

Extra pay items may be established for crushed stone bedding when it is required as an extra. The price will be on a lineal foot basis.

Where required by the Special Provisions or the Bid Proposal, the cost of pavement replacement, boring, crossings of all types and other incidental construction shall be included in the unit price bid for pipe line installation and shall comprise total compensation for all such work.

End of Section

Section 02613 - MISCELLANEOUS STRUCTURES

PART 1 - GENERAL

This section includes the furnishing of all labor, equipment, and materials necessary for the complete construction of tank foundations, valve pits, booster chlorinator stations, master meter pits, pressure reducing stations, and other miscellaneous structures as detailed in the plans and elsewhere in these specifications. The CONTRACTOR shall furnish all equipment and appurtenances as shown on the plans or specified herein and necessary to make a complete and workable system.

PART 2 - GENERAL CONSTRUCTION

2.01 General

These specifications cover general construction techniques which are applicable to all miscellaneous structures and to booster pump stations.

2.02 Clearing

The CONTRACTOR shall remove all trees not marked for preservation, stumps, bushes, etc. within the limits of excavation and regrading. All such cleared material shall be burned in compliance with local and State air pollution control requirements. All stumps, roots, etc. having a diameter of one inch or greater shall be grubbed out to a depth of at least two (2) feet below subgrade elevation for concrete structures and one (1) foot below the ground surface for embankments and other designated sites. Grubbing will not be required outside the structure limits. Other means of disposal shall require approval of the ENGINEER.

2.03 Structural Excavation

Structural excavation shall consist of and include the removal of all materials encountered or involved in the excavation and subgrade preparation for the placing of structures. The final depths and extent of structural excavation will be determined by the nature of the material encountered; however, after excavation to the limits as shown on the drawings, the ENGINEER shall inspect the work and determine if additional excavation is required.

2.04 Earth Excavation

All excavation except that included in rock excavation, which is outlined below, shall be classified as earth excavation. Cost of all excavation, backfilling, regrading, and preparation of site for seeding, etc., shall be included in the Lump Sum Price of the Contract. Excavated material shall be piled adjacent to the structures or convenient places for use in regrading. No extra compensation will be allowed for dewatering excavation, if required. Excavation for structures shall be made 12 inches from outside the nearest wall footing at the bottom and shall be made at such a slope as to make the excavation safe.

All necessary precautions shall be taken to preserve the material below and beyond the lines of all excavation in the soundest possible condition. Any damage to the work due to the CONTRACTOR's operations, including shattering of the material beyond the required excavation lines, shall be repaired at the expense of and by the CONTRACTOR. Any and all excess excavation for the convenience of the CONTRACTOR for any purpose or reason, except as may be ordered in writing by the ENGINEER, and whether or not due to the fault of the CONTRACTOR, shall be at the expense of the CONTRACTOR. Where required to complete the work, all such excess excavation and over-excavation shall be refilled with materials furnished and placed by and at the expense of the CONTRACTOR. All excavation for embankment and structure foundations shall be performed in the dry. No excavation shall be made in frozen materials without the written approval of the ENGINEER.

2.05 Rock Excavation

Rock excavation shall include such rock as is not decomposed, weathered, shattered and which required blasting for removal. Whenever blasting is necessary, ample precautions shall be taken to prevent damage

from flying rock and debris by approved means.

The bottom and side slope of rock or shale upon or against which concrete or previous blanket material is to be placed shall be excavated to the required dimensions as shown on the drawings or established by the ENGINEER. No material will be permitted to extend within the neat lines of the structure. If, at any point in rock or shale upon written orders from the ENGINEER, material is excavated beyond the limits required to receive the structure, the additional excavation shall be filled solidly with concrete. If material is excavated beyond the limits required to receive the structure without written orders from the ENGINEER, the additional excavation shall be brought back to grade with "Class A" concrete at the CONTRACTOR's expense. Slopes shattered or loosened by blasting shall be taken down at the expense of and by the CONTRACTOR.

2.06 Utilization of Excavated Material

All suitable material removed from the excavations shall be used insofar as practicable, in constructing the permanent works and at such other places a directed. The CONTRACTOR shall not waste materials removed from excavations and suitable for use in the construction of the permanent works, without written approval from the ENGINEER.

2.07 Disposal of Surplus and/or Waste Material

All surplus excavated material and/or all waste materials shall be disposed of by widening embankments, fills, or by flattening slopes, or by depositing the material in other areas as designated or directed by the ENGINEER.

Waste material shall also be placed in designated waste areas to the approximate elevations established by the ENGINEER, and the surfaces thereof shall be left in a neat and sightly condition and sloped to provide positive drainage. Compaction of the waste materials shall be required. The CONTRACTOR shall be responsible for controlling erosion.

2.08 Blasting for Excavation

Blasting may be done only to the depth, amount, and extent, and in such locations approved by the ENGINEER. Approval of the methods of blasting by the ENGINEER will not relieve the CONTRACTOR of his responsibility in blasting operation, and no payment will be made for any necessary extra excavation below or outside of the limit lines indicated on the drawings, or modifications thereof, due solely to injury caused by over-shooting, improper blasting, or carelessness on the part of the CONTRACTOR. All material thus removed shall be replaced by concrete when a concrete structure is to be placed upon or against such surface, or by compacted fill material when fill is to be placed thereon, at the expense of the CONTRACTOR and in a manner satisfactory to the ENGINEER. Extra fill is to be of the same type as that to be placed directly above it.

2.09 Sheeting and Bracing

Sheeting and bracing as may be required to safely support the sides of excavations while maintaining the required side slopes shall comply with the safety precautions in the "Associated General Contractors Manual of Accident Prevention in Construction" and the OSHA regulations of the Kentucky Department of Labor. The CONTRACTOR shall perform the additional excavation required and furnish and put in place the necessary sheeting and bracing and shall remove the same as the excavation is filled, at his own expense.

2.10 Removal of Water

The CONTRACTOR shall construct and maintain all necessary channels, flumes and/or other temporary diversion and protective works; shall furnish all materials required therefor; and shall furnish, install, maintain, and operate all pumping and other equipment for dewatering the various parts of the work, and

for maintaining the foundations, trenches, and other parts of the work free from water as required for constructing each part of the work. After having served their purpose, all temporary protective works shall be removed, or leveled, to give a sightly appearance and so as not to interfere in any way with the operation, usefulness or stability of the permanent structures.

2.11 Protection of Finished Structure Excavations

It shall be the CONTRACTOR's responsibility to maintain finished excavated foundation surfaces for the works in good condition until such time as the structures are placed on or against the surfaces.

2.12 Borrow

Borrow excavation shall consist of and include the required excavation and proper utilization of approved materials obtained from designated areas when sufficient quantities of suitable materials are not available form other required excavation.

The control of excavation in any borrow area and the selection of materials therefrom shall at all times be directed by the ENGINEER. On completion of excavation, all borrow pits shall be left in a neat and sightly condition. Unless otherwise approved by the ENGINEER, all borrow pits shall be so graded and dressed that water will readily drain therefrom, and away from all embankments, berms and structures. When shown on the drawings, terraces or diversions shall be constructed to protect the slopes of the borrow areas from erosion and shall be considered a subsidiary of this specification.

2.13 Fill Construction

After clearing operations have been completed, all structure locations shall be proof rolled with a loaded pan or heavy pneumatic tired vehicle to densify upper soils and to locate possible areas which will require undercutting, removal and/or recompaction. This operation shall be conducted under the surveillance of the ENGINEER.

Before initiating filling operations, the CONTRACTOR shall receive approval of fill material by the ENGINEER. Several laboratory Proctor density tests shall be run on representative samples obtained from the proposed borrow material. The OWNER shall be responsible for initial tests only.

Where structures or other appurtenances are constructed on fill, the fill shall be placed in layers not over six (6) inches deep, as measured before compaction, and be thoroughly compacted.

Compaction may be obtained by use of a sheepsfoot roller or pneumatic-tired roller. Water shall be applied as directed to obtain close adhesion between layers and all parts of the material. Fill shall be compacted to a minimum of 95% of the Standard Proctor maximum dry density (ASTM Specifications D-698). A minimum of two (2) compaction tests per each two (2) feet of fill on a structure location shall be run.

In order to prevent damage to existing structures, heavy construction equipment shall not be allowed to operate within approximately 8 feet horizontally of the existing structure exterior wall.

2.14 Backfilling Around Structures

Only suitable material approved by the ENGINEER shall be used for backfilling around structures. The use of excavated rock will be permitted for backfilling provided it is mixed with sufficient earth to form a compact mass and fill all voids.

Backfilling around structures shall have material placed in layers of six (6) inch depth and compacted by pneumatic tools or other small equipment operated by hand. In no case shall the backfilling be allowed to obtain an elevation of one (1) foot above any other area. It shall be uniformly compacted throughout the structure depth. Any deviation shall be cause for the ENGINEER to require the material deposited to be removed and recompacted at the CONTRACTOR's expense.

No rock shall be placed within twelve (12) inches of pipes on the regrade surface. Care shall be exercised

in tamping backfill under, around and over pipes and other structures. Any breakage or damage at such locations during the twelve (12) months guarantee period will be considered defective workmanship and shall be repaired at the CONTRACTOR's expense.

2.15 Backfilling Trenches

The backfilling of sewer, water and other pipe line trenches shall be started immediately after the construction of same has been inspected and approved by the ENGINEER. Backfilling material and placement shall conform with the requirements of Section AA of these Specifications.

2.16 Finish Grading and Seeding

After all backfilling is completed, the area shall be fine graded and evenly shaped in preparation for seeding.

Grading within the construction area and around the outside of building and structure lines shall be performed in a manner which will prevent accumulation of water within the area. Where necessary or where shown, finish grading shall be extended to ensure that water will be directed to drainage ditches, and the site area left smooth and free from depressions which would hold water.

When the final grading has been completed, the entire graded area to be seeded shall be fertilized with 12-12-12 fertilizer, applied at the rate of six pounds per one thousand square feet of area. After this, the ground shall be raked or harrowed until a fine seed bed is prepared. All graded areas shall be left smooth and thickly sown with a mixture of grasses. The mixture of grasses shall consist of one-third (1/3) Rye grass, one-third (1/3) Kentucky Fescue and one-third (1/3) Kentucky Bluegrass by weight, and shall be applied to the graded areas at a rate of not less than one pound of seed per one thousand square feet of area. The seed shall have a minimum of 80% germination and a maximum of 1% weeds. The seed shall be covered with moist earth 1/4" deep. The ground shall be kept watered as needed until the project is completed. All slopes as shall be covered with straw to prevent erosion; The straw shall be applied at least one inch thick to cover all exposed ground.

PART 3 - TANK FOUNDATIONS

3.01 Excavation

The CONTRACTOR shall do all excavation necessary to construct the foundations along the lines and grades given by the ENGINEER and in accordance with the plans. Excavation shall be unclassified and the cost of all excavation shall be included in the lump sum bid for the tank foundation.

3.02 Materials

The CONTRACTOR shall construct the concrete foundations in accordance with the general provisions for reinforced concrete and reinforcing steel as defined elsewhere in these specifications. Concrete used in foundations shall be at least equal to Class A with a 28 day compressive strength of 4000 PSI. Bars shall be accurately placed in accordance with the plans and shall be adequately secured in place. Four (4) copies of shop drawings on reinforcing steel will be required and must be approved by the ENGINEER prior to shipment.

Crushed stone and sand which are required as bedding in ring foundations shall meet the requirements for concrete aggregate as described in these specifications.

3.03 Construction

Concrete shall be placed with a concrete vibrator of the type approved by the ENGINEER. Hand-rodding of concrete tank foundations will be acceptable if at least three (3) men are used simultaneously to rod the concrete. When concrete ring foundations are constructed, the foundation contractor shall place a 6-inch layer of oiled sand inside the ring as shown in the plans. The sand shall be saturated with a rust inhibitive oil using not less than 0.25 gallons per cubic foot of sand. The oil and sand shall be mixed either in a concrete mixer or by wind-rowing by hand with shovels. Pouring of oil upon the sand without mixing will not

be allowed. Around pipe openings, the oiled sand shall be raked out and filled with cement mortar, using one part of cement and two parts of sand.

Anchor bolts, where required, will be of the length, diameter and shape shown on the plans. Anchor bolts must be located exactly as shown on the plans and in an absolute vertical position. Anchor bolts must be securely fastened before pouring concrete and the installation must be approved by the ENGINEER before concrete is poured. The ENGINEER must be present during the time when all concrete is poured.

PART 4 - VALVE PITS

The altitude valve pit for control of water levels in storage tanks shall be constructed by the tank foundation contractor. Details of the valve pit construction are shown on the plans. The pit will be constructed from concrete and/or masonry materials as shown in the plans and in conformance with the appropriate materials specifications contained herein.

Altitude valves shall be installed in the valve pits as indicated on the plans and shall be of the size and type specified thereon. The altitude valve shall be provided with a by-pass line and a check valve as detailed on the plans. The altitude valve shall control water levels to within six (6) inches of a predetermined elevation and shall have a speed control device for regulating closing speed. These valves shall be manufactured as globe body or angle body and shall be either double acting or single acting as designated on the plans. They shall be as manufactured by Golden Anderson Valve Specialty Company, Clayton Valve Co., or approved equal.

The CONTRACTOR shall submit five (5) copies of literature drawings for the valve installation for the ENGINEER's approval.

PART 5 - CHLORINATION STATIONS

Provision of additional chlorination facilities will normally be accomplished at pump stations or tank valve pits. However, when required, chlorination stations will be constructed at the locations shown on the plans. Concrete and Masonry construction shall meet the requirements for these materials as described elsewhere in these Specifications. In accordance with the plans, construction of the chlorination station building shall be similar to that required for pump stations as described elsewhere in these specifications.

PART 6 - CHLORINATION EQUIPMENT

Chlorinators shall be of the type specified on the plans and shall meet the requirements as hereinafter set out. The CONTRACTOR shall provide sufficient hypochlorite or chlorine gas to operate the water system for a period of 30 days. The CONTRACTOR shall also supply one chlorine tester of the comparator type with a range from 0.05 PPM to 1.00 PPM graduated in 9 steps.

6.01 Hypochlorite Solution Feeding Chlorinators

This type chlorinator shall be the single compartment diaphragm type, Fischer & Porter, Wallace & Tiernan, or equal and shall be installed in the structures when and where shown on the plans. The unit is to be electrically driven and activated by a flow switch, in sequence with other pumps, or by other devices as shown on the plans. The unit must be capable of feeding hypochlorite into a main with the line pressure as shown in the plans. CONTRACTOR must also supply a 50 gallon plastic solution tank and sufficient tubing to complete the installation. The unit will normally be used where a constant flow rate exists.

Where the water flow rate is variable such as in a gravity flow situation, a meter-driven hypochlorinator may be required as shown in the plans.

6.02 Gas Chlorinator

Under this item, the CONTRACTOR shall furnish and install mechanical diaphragm solution feed, vacuum-type chlorination equipment. The unit shall be installed complete with piping, valves, fittings, and tubing at the locations shown on the plans.

Control of the chlorinator shall be intermittent start-stop operation controlled by a solenoid valve, flow switch, metering pump or other procedure which interrupts the flow of water to the injector. A dual installation with automatic switchover will be shown on the plans when required.

The chlorinator shall consist of a chlorine pressure regulating valve, rotameter feed rate indicator, vacuum relief valve, and a combination injector and diaphragm check valve. The feed rate indicator shall read directly in pounds of chlorine per hours. The chlorinator shall deliver the solution against the maximum line pressure which is expected at the location.

The unit may be wall-mounted or cylinder-mounted. Also required with the gas chlorinator are plastic hose connections, two 150 pound cylinders of liquid chlorine (or 30 days supply if greater), and platform scales for weighing the cylinder in use. For a dual installation, scales are required for each cylinder.

The CONTRACTOR shall submit five (5) copies of drawings and literature for the chlorinator installation for the ENGINEER's approval.

PART 7 - MASTER METER INSTALLATION

Installation of the system master meter or other large meters generally greater than two (2) inches shall be accomplished in a meter pit constructed in accordance with the Standard Details and the appropriate specifications for concrete and masonry work contained herein. The installation shall be equipped with gate valves, testing ports, check valve and locking cover as shown in the Standard Details. The meter pit installation shall be waterproof.

Meters larger than two (2) inches shall be compound meters designed with a turbine section for large flows and a rotating disc section for small flows, unless otherwise specified in Section IX. The meter may be equipped with either single or double registers.

The main case shall be high grade waterworks bronze, with hinged lid covers. The meter must have a maximum operating pressure of 150 PSI. The registers must be hermetically sealed direct reading. The measuring chambers shall be of bronze alloy composition. Measuring disc and turbine valves shall be of polypropylene or other corrosion-resistant material. The meter shall measure water within 2 percent of a separately measured volume.

PART 8 - PRESSURE REDUCING OR SUSTAINING STATIONS

Reduction or maintenance of pressures in the main distribution system shall be accomplished by construction of pressure reducing or sustaining stations. These shall be constructed at the locations shown on the plans and in conformance with the Standard Details.

The requirements for pressure reducing, pressure sustaining, and other automatic, special-purpose valves

are covered in Section AB of these specifications.

The valves will generally be housed in a manhole type installation as shown in the Standard Details. Manhole is to be set to line and grade shown on the plans and is to be equipped with a locking cover and provisions are to be made for drainage of the installation. The installation is to be waterproof. The pressures to be maintained by the installation will be described in the plans or in the Special Provisions of these specifications.

The CONTRACTOR shall submit five (5) copies of the literature and drawings for the ENGINEER's approval from the pressure reducing valve manufactured covering this installation.

PART 9 - MAINTENANCE

All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the CONTRACTOR in good condition at all times until final acceptance by the OWNER. The CONTRACTOR shall maintain trench backfill at the original ground surface by periodically adding specified backfill material as necessary or when directed by the ENGINEER. Such maintenance shall be continued until final acceptance of the project.

PART 10 - PAINTING MISCELLANEOUS STRUCTURES

All exposed piping and valves within miscellaneous structures including valve pits, meter pits, chlorinator stations, pump stations, etc. shall be painted. Where manholes are used in the construction of underground structures, the hatchway, cover and all exposed metal shall be painted. Painting shall consist of surface preparation, two prime coats of Ramuc Utility Undercoater and three top coats of Ramuc Utility Enamel (color by ENGINEER) as manufactured by Inertol Co., Inc. or equal. Where piping and valves are tar coated, they shall first be painted with white shellac to prevent the tar from coming through the final coat. Manholes and masonry walls where underground shall be waterproof. Exterior walls shall be given two coats of black waterproof coating similar or equal to Koppers Bitumastic No. 300-M.

PART 11 - MEASUREMENT AND PAYMENT

Payment for all excavation and fill work shown on the plans and herein specified, that is required to complete the clearing, grubbing, site grading, roads, structural excavation, trench excavation, borrow excavation, backfill, sheeting, shoring, topsoil, crushed stone or gravel, drainage, pumping, embankment fills and any other excavation and fills required to construct the plant as shown on the Drawings shall be included in the lump sum price bid in the Bid Schedule and no measurement of the quantities will be made. The contours and elevations of the present ground are believed to be reasonably correct, but are not guaranteed. The CONTRACTOR shall satisfy himself by actual examination of the site of work as to the existing elevations and contours and the amount of work required under this Section.

If the quantities of common excavation required are increased or decreased as a result of changes made in the Drawings or by direction of the ENGINEER in writing during construction, the ENGINEER will determine the quantities of such changes and the lump sum price will be adjusted upward or downward as applicable to compensate for such changes at the applicable adjustment unit price bid for common

excavation in the Bid Schedule.

No adjustment payment for trench excavation in earth shall be made. Adjustment payment for such excavation shall be included in the applicable adjustment unit prices bid per linear foot of various sizes of pipe laid as listed in the applicable adjustment unit price bid in the Bid Schedule.

The cost of all soils inspections and testing shall be paid by the OWNER. If compaction tests do not meet required values, the cost of additional testing as required by the ENGINEER shall be paid by the CONTRACTOR.

End of Section

SECTION 11310 – CLOSE COUPLED IN-LINE PUMPS

PART 1. GENERAL

1.1 Work Included

A. Furnish and install close coupled in line pumps.

B. Related work:

Section 11400 - Pump Controls
Section 16797 - Telemetry

1.2 Reference Standards

The work in this section is subject to the requirements of applicable portions of the following standards:

A. Hydraulic Institute
B. ANSI – American National Standards Institute
C. ASTM – American Society for Testing and Materials
D. IEEE - Institute of Electrical and Electronics Engineers
E. NEMA – National Electrical Manufacturers Association
F. NEC – National Electrical Code
G. ISO – International Standards Organization

1.3 Submittals

A. Provide six (6) sets of operation and maintenance manuals.
B. Provide certified testing of pumps prior to shipment.

1.4 Warranty

The warranty period shall be a non-prorated period of 24 months from Owner's acceptance.

PART 2. PRODUCTS

2.1 General

Furnish and install as shown on the plans, 2 American-Marsh Pumps vertical in-line frame mounted size 4x4x10 model REI centrifugal pumps, or approved equal. Each shall be capable of pumping 489 GPM when operating at full speed and when operating against a total dynamic head of 77 feet at the temperature, specific gravity and viscosity indicated. The pump shall operate at 1750 RPM and shall have 82 percent minimum efficiency at the design point. The pumps shall be rated for continuous service and shall be bronze fitted construction suitable for pumping water.

2.2 Construction

The adapter to the casing is to be one piece cast iron construction capable of mounting a type 21 mechanical seal with carbon/silicon carbide/stainless steel parts and viton elastomers, rated at 230 degrees F. Casing shall be of cast iron ASTM-A48, Class 30 cast iron with tensile strength of 30,000 psi or ductile iron with minimum tensile strength of 60,000 psi. Pump units shall be capable of standing hydrostatic test pressures of 1.5 times maximum working pressure. All assembly points shall be of machine register fit to assure proper alignment.

The flanged casing discharge nozzles shall conform to ANSI B16.1 specifications with minimum 150 psi ratings at 250 degrees F. A renewable wear ring shall be fitted to the case at the suction fitting.

The casing shall have tapped and plugged drain connections, air vent and ¼" NPT gauge taps on the suction and discharge nozzles. The case shall be of the suction cover design for ease of maintenance and service with out disturbing discharge piping, bearing frame or motor mounting. The impeller shall be of the enclosed design, investment casted of 304 stainless steel. The seal cavity shall have an internal self-bleeding channel with a provision for internal plug off to allow an external air bleed.

The pump shaft shall be 416/420 stainless steel and protected with a 304 stainless steel shaft sleeve. A neoprene deflector shall be mounted on the shaft to prevent liquid from entering the motor.

2.3 Factory Testing

A pump performance test is to be performed on each pump in accordance with Hydraulic Institute test standards. Hydraulic institute acceptance grade 3B shall be used to determine acceptable performance testing results. Flow rate +/- 9%, Head +/- 7%, Power +9%, Efficiency -7%. Certified test data shall be provided prior to shipment of the equipment.

2.4 Motor

The motor shall be not less than 15.0 hp 1750 RPM, NEMA design B squirrel cage type, TEFC frame 254TC premium efficiency motor with 1.15 service factor and suitable for operation on 460 volt, 3 phase, 60 hertz power supply. The motor shall be specifically designed for vertical mounting orientation. Breather/drain shall be located on the motor drive end bell to prevent moisture accumulation. A 'drip cover' shall be installed on the non-drive end. Lifting lugs shall be provided for vertical lifting of the motor. Standard 'footed' or 'round body' motors designed for horizontal mounting will not be acceptable. Motor size shall be sufficient to prevent overloading at any operating condition. Following installation, grouting and connection of all piping the pump and motor must be checked for alignment in accordance with standards of the Hydraulic Institute.

An Aegis SGR, Inpro MGS Ground Seal, or equal shaft grounding ring shall be provided for the lower bearing of each motor.

PART 3. EXECUTION

3.1 Installation

A. Install pumps in accordance with manufacturer's instructions.

3.2 Field Testing

A. Test pumps to ensure pumps are operating properly at all speeds.

End of Section

SECTION 11400 - PUMP CONTROLS

PART 1. GENERAL

1.1 Work Included

A. The Contractor shall furnish, install, and place into successful operation a level control system designed to automatically control the operation of two booster pumps integrated with Variable Frequency Drives (VFD) and other appurtenances as required. The control system supplier shall work closely with the VFD vendor and pump supplier to provide a single integrated set of schematic drawings for this project.

B. Related work:

Section 11300 - Vertical Inline Multistage Pumps
Section 16797 - Telemetry

1.2 Reference Standards

The work in this section is subject to the requirements of applicable portions of the following standards:

A. Hydraulic Institute
B. ANSI – American National Standards Institute
C. ASTM – American Society for Testing and Materials
D. IEEE - Institute of Electrical and Electronics Engineers
E. NEMA – National Electrical Manufacturers Association
F. NEC – National Electrical Code
G. ISO – International Standards Organization

The entire system shall be constructed in strict accordance with the latest published standards of NEMA, IEEE and ANSI. Wherever possible, control system components shall be Underwriters Laboratory 508 listed. All control hardware and software shall be factory assembled, wired and thoroughly tested prior to shipment. The control panels shall bear serialized UL 508 "Enclosed Industrial Control Panel" label. The main power circuit breaker shall be rated as suitable for use as a service entrance.

1.3 Submittals

The Contractor shall submit six (6) complete sets of the following information for the Engineer's approval:

a. Dimension drawings, wiring and/or hydraulic drawings for field and pipeline mounted equipment.

b. Fabrication and nameplate legend drawings, internal wiring and piping schematic drawings, system schematic drawings illustrating all components being supplied, with complete pneumatic and electrical connections.

c. Actual system schematic drawings shall be provided. Manufacturers catalog cuts or standard drawings merely showing "typical" circuitry are not acceptable.

d. Installation, Operation and Maintenance Manuals. This manual shall cover, in addition to installation and general operating procedures, the operation, maintenance, and servicing procedures of the major individual components provided with the pump controls.

1.4 Warranty

The warranty period shall be a non-prorated period of 24 months from Owner's acceptance.

PART 2. PRODUCTS

2.1 General

A. Automatic Level Control. A level sensor (submersible pressure transducer) shall monitor the Upper Virden Tank level continuously and deliver this data to the new Lower Virden Booster Station via radio telemetry and SCADA system. The pump/s shall start and stop as required, alternating in accordance with the operator's selections, and then increase and decrease the speed of the pump/s in order to maintain an acceptable level of water in the Upper Virden Tank. A "Constant Speed" variable shall be made available as well as the "Variable Speed" option. Under constant speed control, the pumps shall run at a preset speed at all times. The lag pump shall start if the lead pump is not keeping up with the demand of the tank.

B. Interlocks and Failure Circuits. The pumping system consists of two pumps of equal horsepower. If a pump running signal input is not received within an adjustable time period of being called to start, a pump failure alarm shall be annunciated. The respective pump shall be removed from the alternation scheme and the next pump in sequence shall operate in its place. The pump shall remain cutout until the failure condition has cleared and the reset button has been pressed.

C. Alternation. The pumps shall be alternated after each complete pumping cycle or after 12 hours of continuous operation of one pump.

2.2 Variable Frequency Drives

A. General. VFD system selection and sizing: Provide two (2) VFD systems with sufficient capacity to supply full rated output of the Booster Pump motors and meet all other requirements of this specification.

B. Quantity. VFD systems are required for the two (2) booster pumps operating as defined by the drawings.

C. Power Factor Correction. Provide VFD system that presents a load with 95 percent lagging power factor to the power supply system for a motor running with a full load power factor of 70 percent. The corrected power factor must NOT be leading under any operating condition.

D. Mechanical Resonance. Provide VFD with frequency controls programmed to avoid continuous operation at or near any critical frequencies of the pump and motor system.

E. Basic Description:

a) The controller shall produce an adjustable AC voltage/frequency output. It shall have an output voltage regulator to maintain correct output V/Hz despite incoming voltage variations.

b) The controller shall have a continuous output current rating of 100% of motor nameplate current.

c) The VFD shall be of the pulse width modulated type and shall consist of a 12-pulse full-wave diode bridge converter to convert incoming fixed voltage/frequency to a fixed DC voltage. The Pulse Width Modulation strategy shall be of the space vector type implemented in a microprocessor, which generates a sine-coded output voltage.

d) The phase shift transformers required to produce the 6-phase input to the pulse rectifier shall be factory wired and mounted within the VFD enclosure as an integral part of the VFD assembly. External transformers shall not be required.

e) The inverter output shall be generated by power transistors, which shall be controlled by six identical base driver circuits. The VFD shall not induce excessive power losses in the motor. The worst case RMS motor line current measured at rated speed, torques, and voltage shall not exceed 1.05 times the rated RMS motor current for pure sine-wave operation.

F. Basic Features:

The VFD controller shall have the following basic features:

a) The keypad of each power unit shall include a “POWER ON” light, a VFD fault light, a VFD run light, manual stop pushbutton, manual start pushbutton, a fault reset pushbutton, an “AUTOMATIC” pushbutton and increase/decrease pushbuttons.

b) The VFD shall be software programmable to provide automatic restart after any individual trip condition resulting from over-current, over-voltage, under-voltage, or over-temperature. For safety, the drive shall shut down and require manual reset and restart if the automatic reset/restart function is not successful within a maximum of three attempts within a short time period.

c) A speed droop feature shall be included which reduces the speed of the drive on transient overloads. The drive is to return to set speed after transient is removed. If the acceleration or deceleration rates are too rapid for the moment of inertia of the load, the drive is to automatically compensate to prevent drive trip.

d) Automatic restart after drive trip or utility failure.

e) Speed profile: Individual adjustable settings for start, stop, entry, slope, and minimum and maximum speed points.

f) Process signal inverter: Software selectable to allow speed of drive to vary inversely with input signal.

g) A critical speed avoidance circuit will be included for selection of two critical speeds with a rejection band centered on that speed. The drive will ignore any speed signals requiring drive operation within the rejected band.

h) Proportional and integral set-point process controller with menu driven selection and programming via door-mounted keypad.

i) Pick up a spinning load: The VFD shall be able to determine the motor speed and resume control of a motor, which is spinning in either direction without tripping.

j) The VFDs shall be installed inside a NEMA stainless steel enclosure with a 3-point latch and UL 508 label. Refer to “Equipment Enclosure” in this section for additional requirements.

7) VFD Manufacturer: The VFD shall be ACH550-U as manufactured by ABB or equal.

2.3 Pilot Devices

A. General. Selector switches shall include removable 10 amp, 600-volt double make double break contacts. All pilot lights, selector switches and pushbuttons shall be rated for NEMA/UL 4 applications. They shall be not less than 7/8" diameter. All pilot devices shall be manufactured by ABB.

B. Relays and Timers. Relays shall be general-purpose plug-in type. They shall be a minimum of 3-pole, double-throw with contacts rated for 10 amps at 240 VAC. All relay sockets shall be 11-blade to

allow for future expansion. Timers shall be double-pole, double-throw, and solid-state plug-in type. With contacts rated for 5 amps at 240 VAC. Sockets shall be eight-pin octal types. Timers shall be adjustable from 1-1023 seconds in one-second increments. A "time cycle in progress" indicating LED shall be provided. Relays and timers shall be manufactured by ABB.

C. Running Time Meters. An electronic digital elapsed time meter shall be provided as an integral part of the VFD HMI and mounted on the enclosure door for each pump. It shall be 6 digit (99999.9 hours) program-change to reset type. Each pump run signal shall be derived from the VFD.

D. Submersible Pressure Transducers (1 each for suction and discharge and 1 at Upper Virden Tank). The transducer body shall be manufactured from 316 stainless steel. It shall be available in standard pressure ranges of 15 psi, 30 psi, 50 psi, 100 psi, 200 psi, 300 psi, and 500 psi; and output a 4-20 A signal derived from 10-30 VDC over the operating pressure range provided. The output shall be input to the Automation Direct Telemetry Controller. Control of the VFD's shall be performed by the Automation Direct Telemetry Controller. The transducer shall be provided with sufficient cable to reach the control panel and shall not be spliced. TVSS protection shall be provided.

E. Phase Monitoring Relay. Phase monitoring relay shall be integral to each VFD.

F. Motor Circuit Breakers. Each pump motor shall be provided with a circuit breaker. Circuit breakers shall be thermal magnetic, "E" frame or better. A door interlocked, padlockable operating handle shall prevent the enclosure door form opening, when any pump circuit breaker is in the ON position. A defeat mechanism shall be included on the operating handle for use by authorized service personnel.

Overload reset operators shall be provided to reset the overloads without opening the enclosure door.

G. Control Circuit Breaker. Provide a door mounted 20 amp control power circuit breakers for each controller.

H. Transformers. The primary and back-up controllers shall have separate independent power sources. Each transformer shall be able to provide enough power for all loads plus an extra 1000VA. Transformers shall have primary and secondary fusing and be mounted inside the control enclosure if possible.

I. Convenience Outlet. A 20 amp, duplex, GFI receptacle and circuit breaker shall be mounted on the door of the enclosure. If the power to the control panel is 240 or 480 VAC, 3-phase, 3-wire, a control transformer sized 1 KVA above the system full load requirements shall be provided.

J. Lightning Transient Protector. A lightning-transient protector shall be provided. Units shall be instant recovery, long life and have no holdover currents. Provide OVR Series manufactured by ABB or equal.

K. Engraved Legends. All installed devices shall be permanently identified with engraved legends.

2.4 Alarms

A. General. When a pump alarm condition is active its respective pump symbol on the HMI of the CTU - ODC Wonderware SCADA system at the Water Office shall turn red. The pump symbol shall return to its normal state (green running, white off) once the alarm has been cleared and reset.

All of the other alarms and the pump alarms shall be displayed in red text in an alarm log when they are active. Once acknowledged, they shall be displayed in blue text. If an alarm condition clears before it is acknowledged, it shall be displayed in green text. If the alarm condition reactivates before it is acknowledged, a new alarm shall be displayed in the alarm log. Once an alarm has cleared and been acknowledged, it shall be stored in an event log for future review by the operator. All alarms shall be

time and date stamped, and displayed in the alarm log in reverse chronological order. The following alarms shall be monitored:

Low Suction Alarm
High Discharge Alarm
Pump No. 1 Failure
Pump No. 2 Failure
Pump No. 1 Overtemp
Pump No. 2 Overtemp
Pump No. 1 VFD Failure
Pump No. 2 VFD Failure

B. Alarm Light. An externally mounted common alarm light shall flash when any of the door mounted alarm pilot lights turn on. The alarm light shall be 25 watt and include a red, heat resistant, unbreakable polycarbonate lens.

2.5 Pressure Switches

Pressure switches shall provide low suction head/ high discharge head pump cutoff. Pressure switches shall be Allen-Bradley Model 836E 0 to 60 psi, or approved equal.

2.6 Equipment Enclosure

The booster pump control and power equipment shall be mounted in a 14-gauge, NEMA/UL 12 enclosure. All outer doors over 20" in height shall be provided with a pad lockable, 3-point latch system. Internal components shall be mounted on a heavy duty back plate. Heavy items shall be provided with mounting reinforcements as required.

All selector switches, pushbuttons, pilot lights, and HMIs shall be operable and visible without opening the outer door. The internal temperature must remain below 100 degrees Fahrenheit during all weather and load conditions. Thermal calculations shall be provided with submittals. Refrigeration is the only acceptable method to maintain the proper internal temperature.

PART 3. EXECUTION

3.1 Installation

Installation shall be performed in accordance with these Specifications the current edition of the National Electric Code and the Kentucky State Building Code.

The controls shall be adjusted to start and stop the pumps at approximately the levels required by the job conditions.

3.2 Testing

All pumps shall be site tested after installation to demonstrate satisfactory operation without excessive noise, vibration, cavitations or over-heating. The manufacturer along with the authorized representative shall conduct site tests. Tests shall include checking for correct rotation, maximum motor amperage draws within nameplate specifications, balanced voltages on each power leg with the pump operating to within manufacturers tolerances, and demonstrated compatibility of the pump/motor with the controls supplied. Test results shall be in printed form and signed by the manufacturer or his Representative and supplied to the Owner.

The control panel shall undergo both a dry logic test and a full operational test with all systems operating. Test records, shall be provided for the specific pumps furnished. Test-frame results for impeller only will not be acceptable. Each pump shall be tested as a complete unit after installation in the station.

Factory test instrumentation must include flow measuring with indicator; compound suction gauge; bourdon tube type discharge pressure gauge; electrical meters to measure amperes, volts, kilowatts and power factor; speed indicator and a vibrometer capable of measuring both amplitude and frequency.

3.3 Training

The manufacturer shall provide the services of a factory-trained representative for a maximum period of one day to perform initial start-up of the pump station and to instruct the Owner's operating personnel in the operation and maintenance of the equipment.

3.4 Spare Parts

Provide a complete replacement set of spare bulbs and fuses.

End of Section

PART 1GENERAL

1.01 DESCRIPTION

A. This section is to cover a complete upgradefrom full load start to Variable Frequency Drive (VFD) consisting of a pulse width modulated (PWM) inverter for:the Happy Top and Ballard booster pumping stations.

1.02 Quality Assurance

A. References
   1. Institute of Electrical and Electronic Engineers (IEEE)
      a. IEEE 519-1992, “Recommended Practices and Requirements for Harmonic Control in Electric Power Systems”
   2. National Electrical Manufacturers Association:
      a. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. NEMA FU1 - Low Voltage Cartridge Fuses.
      c. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives.
      d. NEMA ICS 7.1 – Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.
   3. Underwriters Laboratories (UL)
      a. UL508C

B. Qualifications
   1. The VFD shall be provided by a company with a complete line of HVAC controls.

1.03 SUBMITTALS

A. Submittals shall include the following information:
   1. Product specifications
   2. Dimensional information including physical dimensions and mounting information
   3. Power wiring connections
   4. Control wiring connections

PART 2PRODUCTS

2.01 Variable Frequency Drives

A. The VFD shall generate the required variable frequency through three main input voltage lines connected to a coil capacitor LC filter and diode bridge. This shall produce a DC voltage for an insulated gate bi-polar transistor (IGBT) bridge. The IGBT bridge shall produce a pulse-width modulated (PWM) AC voltage for the motor. A microprocessor shall control the motor according to measured signals and control commands set from the VFD control panel. Control commands may be provided by stand-alone sensor input or by output from a DDC building management system.
   1. Integral power supply shall be one of the following as required by each motor:
      a. 200-240 VAC, 3 phase, 45-66 Hz, ± 10%
      b. 380-500 VAC, 3 phase, 45-66 Hz, ± 10%
      c. 525-690 VAC, 3 phase, 45-66 Hz, ± 10%
   2. The ambient ratings and temperature ranges shall:

a. Operating: 14°F to 104°F (-10°C to 40°C)
b. Storage: -40°F to 140°F (-40°C to 60°C)
c. Humidity range: 5 to 95% RH, non-condensing

B. The Enclosure shall be rated NEMA 1.

C. The VFD shall be RoHS compliant. The VFD will not contain electrolytic capacitors The VFD circuit boards shall be lead-free.

D. All Variable Frequency Drives shall have the following standard features:
1. The VFD shall have Pump and Fan Startup Wizards that can be modified using a personal computer-based commissioning tool with an optional software package, or a field removable control panel. The graphic display shall be removable for separate mounting, a minimum of 45 feet away from the VFD.
2. The VFD shall log and display as a minimum, without adding separate instruments or other equipment, the following:
   a. Temperature of the heat sink
   b. Motor temperature
   c. Output frequency
   d. Status of analog and digital inputs and outputs
   e. Motor speed in rpm
   f. Total kWh consumed
   g. Total kWh trip counter
   h. Total kWh run counter
   i. Total hours run
3. The VFD shall be UL, cUL, and CE approved
4. The VFD shall be provided with built-in RFI filters and all models 3 HP or more shall include an DC Choke
5. The VFD shall have the capability of communicating with over the following protocols:
   a. BACnet/MSTP and BACnet/IP
   b. LONBus
   c. Modbus RTU and Modbus/TCP
   d. N2
6. The VFD shall accept a 0-10 Vdc or 4-20 mA signal, as well as six programmable digital inputs.
7. The VFD shall have a real-time clock for timed functions.
8. The VFD shall include a minimum of two programmable output relays, to provide signals such as run, ready or fault. It shall also include one 4-20 mA or 0-20 mA programmable output to provide signals such as motor speed, output frequency, or any other selected information.
9. The VFD shall include a Proportional + Integral + Derivative (PID) controller as standard to provide closed loop control directly from a signal transmitter without the need for external signal conditioning.

E. The VFD shall have the ability to be place into Panel Control mode. In the panel control mode, the operator shall have the ability to enter a speed reference into the display to control the speed of the motor.

F. The VFD shall have sufficient capacity and provide a quality waveform so as to achieve full output power of the motor without causing excessive additional heat rise.
1. The minimum efficiency of the drive shall be:
   a. >96% at 100% load
   b. >92% at 20% load

G. The VFD shall comply with the following EMC standards:
1. Immunity: EN50082-1, -2, EN61800-3
2. Emission: EN50081-1,-2, EN61800-3

H. Output frequency range of 0-320 Hz with a resolution of 0.01 Hz
   1. It shall be possible to set the switching frequency within the range of 3 kHz to 16 kHz to minimize audible motor noise.

I. A minimum of 8 preset motor speeds shall be available.

J. The VFD shall provide 3 skip frequencies with lower and upper frequency set-points to avoid mechanical resonance.

K. The VFD shall protect itself against:
   1. Input transients to VDE0160 class W2
   2. Loss of motor phase
   3. Grounding of any output phase
   4. Loss of speed reference

L. The VFD shall have an input for a motor thermistor to monitor motor temperature. If a motor thermistor is not connected, the VFD shall model the motor temperature in its software. When overheating of the motor is predicted, an alarm or automatic shutdown shall be initiated.

M. The VFD shall provide full electrical isolation between power and control components, including input and output signals.

N. The VFD shall have the following protection functions:
   1. Heat sink over-temperature
   2. Under-voltage protection
   3. Over-voltage protection
   4. Over-current protection
   5. Earth fault protection
   6. VFD fault protection
   7. Loss of input/output phase protection
   8. Motor stalled protection
   9. Motor under-load protection
   10. Motor over-temperature protection
   11. short circuit protection
   12. External fault injection

O. The VFD shall consist of separate modules for the control section, power section, and fan. Each section shall be able to be removed and replaced independent of the other sections.

P. The entire power section must be in a steel enclosure. No other enclosures are acceptable.

Q. The control unit section of the VFD shall have the ability to be powered by an external 24 Vdc power supply to allow access to the stored data and to allow for: commissioning, field bus applications, and checkout prior to connecting the main supply.

R. The VFD control panel shall display at least five run status indicators, including:
   1. Run
   2. Ready
   3. Fault
   4. Motor Direction
   5. Stop

S. The VFD control panel shall have the ability to monitor at least 9 real-time actual values or parameters.

T. The control panel shall allow the user to lock out parameters by choice of a password or parameter selection.

U. The control panel shall have EEPROM to retain all parameters when the VFD is powered down.

V. The control panel shall show, on a fault condition, the following information:
   1. Operation days
   2. Operation hours
   3. Output frequency
   4. Motor current
   5. Motor voltage
   6. Motor Power
   7. Motor Torque
   8. DC voltage
   9. Unit temperature
   10. Run status

W. Software
   1. The VFD Manufacturer shall offer the following software, at no additional charge or license fee:
      a. VFD commissioning software
      b. Updated versions of VFD system software
      c. Updated versions of VFD applications software
      d. Updated versions of VFD option board software

PART 3EXECUTION

3.01 Installation

A. The VFD shall be installed by the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer, as outlined in the installation manual.

B. The VFD power wiring shall be completed by the electrical contractor. The contractor shall complete all power wiring in accordance with the wiring recommendations of the VFD manufacturer, as outlined in the installation manual.

3.02 Commissioning

A. Commissioning and startup shall be provided by a technician who has been trained and certified by the VFD manufacturer.

B. The VFD shall be commissioned in accordance with the recommendations of the VFD manufacturer, as outlined in the application manual.

3.03 Warranty

A. All VFD components, parts and assemblies shall be guaranteed against defects in materials and workmanship for 36 months.

END OF SECTION

SECTION 16482 - MOTOR-CONTROL CENTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Technical Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes motor-control centers for use on ac circuits rated 600V and less.

B. Related Sections include the following:

1. Division 16 Section "Basic Electrical Materials and Methods" for general materials and installation methods.
2. Division 16 Section "Electrical Identification" for labeling materials.
3. Division 16 Section "Fuses."

1.3 SUBMITTALS

A. Product Data: For products specified in this Section. Include dimensions, ratings, and data on features and components.

B. Shop Drawings: For each motor-control center specified in this Section. Include dimensioned plans, elevations, and component lists. Show ratings, including short-time and short-circuit ratings, and horizontal and vertical bus ampacities.

1. Schedule of features, characteristics, ratings, and factory settings of individual motor-control center units.
2. Wiring Diagrams: Interconnecting wiring diagrams pertinent to class and type specified for motor-control center. Schematic diagram of each type of controller unit indicated.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Maintenance Data: For products to include in the maintenance manuals specified in Division 1.

E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

F. Qualification Data for Field Testing Agency: Certificates, signed by Contractor, certifying that agency complies with requirements specified in "Quality Assurance" Article below.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles (160 km) of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Field Testing Agency Qualifications: An independent testing agency with experience and capability to satisfactorily conduct testing indicated without delaying the Work. Evaluation criteria shall be according to ASTM E 699.

C. Source Limitations: Obtain similar motor-control devices through one source from a single manufacturer.

D. Comply with NFPA 70.

E. Listing and Labeling: Provide motor-control centers and components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for motor-control centers, including clearances between motor-control centers and adjacent surfaces and items, and are based on types and models indicated. Other manufacturers' motor-control centers with equal performance characteristics and complying with indicated maximum dimensions may be considered. Refer to Division 1 Section "Substitutions."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver in shipping splits of lengths that can be moved past obstructions in delivery path as indicated.

B. Store so condensation will not occur on or in motor-control centers. Provide temporary heaters as required to prevent condensation.

C. Handle motor-control centers according to NEMAICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers." Use factory-installed lifting provisions.

1.6 COORDINATION

A. Coordinate features of controllers and accessory devices with pilot devices and control circuits to which they connect.

B. Coordinate features, accessories, and functions of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, and the duty cycle of the motor and load.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Spare Indicating Lights: Furnish 6 of each type required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allen-Bradley Co.; Industrial Control Group.
2. ASEA Brown Boveri, Inc.
3. Danfoss Inc.; Danfoss Electronic Drives Div.
4. Eaton Corp.; Westinghouse & Cutler-Hammer Products.
5. Furnas Electric Co.
6. General Electric Co.; Electrical Distribution & Control Div.
7. Siemens Energy & Automation,Inc.
8. Square D Co.

2.2 MOTOR-CONTROL CENTERS

A. Enclosures: Flush- or surface-mounted cabinets as indicated. NEMA250, Type 1, unless otherwise indicated to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Compartments: Modular; individual doors have concealed hinges and quick-captive screw fasteners. Interlocks on combination controller units require disconnect means in off position before door can be opened or closed, except by consciously operating a permissive release device.
3. Interchangeability: Compartments are constructed to remove units without opening adjacent doors, disconnecting adjacent compartments, or disturbing the operation of other units in control center. Units requiring the same size compartment are interchangeable, and compartments are constructed to permit ready rearrangement of units, such as replacing 3 single units with a unit requiring 3 spaces, without cutting or welding.
4. Wiring Spaces: Each vertical section of structure with horizontal and vertical wiring has spaces for wiring to each unit compartment in each section, with supports holding wiring in place.

B. Short-Circuit Current Rating for Each Section: Equal to or greater than indicated available fault current in symmetrical amperes at motor-control center location.

2.3 BUSES

A. Material: Plated copper.

B. Ampacity Ratings: As indicated for horizontal and vertical main buses.

C. Neutral Buses: Full size.

D. Equipment Ground Bus: Noninsulated, horizontal copper bus 2 by 1/4 inch (50 by 6 mm), minimum.

E. Horizontal Bus Arrangement: Main phase, neutral and ground buses extended with same capacity the entire length of motor-control center, with provision for future extension at both ends by bolt holes and captive bus splicesections or approved equivalent.

F. Short-Circuit Withstand Rating: Same as short-circuit current rating of section.

2.4 FUNCTIONAL FEATURES

A. Description: Modular arrangement of motor controllers, control devices, overcurrent protective devices, transformers, panelboards, instruments, indicating panels, blank panels, and other items mounted in compartments of motor-control center as indicated.

B. Motor-Controller Units: Combination controller units of types and with features, ratings, and circuit assignments indicated.

1. Units with full-voltage, across-the-line, magnetic controllers up to and including Size 3 are installed on drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
2. Units have short-circuit current ratings equal to or greater than short-circuit current rating of motor-control center section.
3. Units in motor-control centers with Type B and C wiring are equipped with pull-apart terminal strips or drawout terminal boards for external control connections.

C. Overcurrent Protective Devices: Types of devices with features, ratings, and circuit assignments indicated. Individual feeder-tap units through 225-A rating shall be installed on drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.

D. Transient Voltage Surge Suppressors: Connected to motor-control center bus.

E. Spaces and Blank Units: Compartments fully bused and equipped with guide rails or equivalent, ready for insertion of drawout units.

F. Spare Units: Type, sizes, and ratings as indicated, and installed in compartments indicated "spare."

2.5 MAGNETIC MOTOR CONTROLLERS

A. Description: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.

B. Control Circuit: 120 V; obtained from integral control power transformer, unless otherwise indicated. Include a control power transformer with adequate capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Combination Controller: Factory-assembled combination controller and disconnect switch with or without overcurrent protection as indicated.

1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses indicated. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a Nationally Recognized Testing Laboratory.
2. Nonfusible Disconnect: NEMA KS 1, heavy-duty, nonfusible switch.
3. Circuit-Breaker Disconnect: NEMA AB 1, motor-circuit protector with field-adjustable short-circuit trip coordinated with motor locked-rotor amperes.

D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect, and with appropriate adjustment for duty cycle.

E. Multispeed-Motor Controller: Match controller to motor type, application, and number of speeds; include the following accessories:

1. Compelling relay ensures motor will start only at low speed.

2. Accelerating relay ensures properly timed acceleration through speeds lower than that selected.
3. Decelerating relay ensures automatically timed deceleration through each speed.

F. Star-Delta Controller: NEMA ICS 2, closed transition with adjustable time delay.

G. Part-Winding Controller: NEMA ICS 2, closed transition with separate overload relays for starting and running sequences.

H. Autotransformer Reduced-Voltage Controller: NEMA ICS 2, closed transition.

I. Solid-State, Reduced-Voltage Controller: NEMA ICS 2, suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.

1. Adjustable acceleration rate control uses voltage or current ramp, and adjustable starting torque control has up to 500 percent current limitation for 20 seconds.
2. Surge suppressor in solid-state power circuits provides 3-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
3. LED indicators show motor and control status, including the following conditions:

   a. Control power available.
   b. Controller on.
   c. Overload trip.
   d. Loss of phase.
   e. Shorted silicon-controlled rectifier.

4. Automatic voltage-reduction controls to reduce voltage when motor is running at light load.
5. Motor running contactor operates automatically when full voltage is applied to motor.

2.6 VARIABLE-FREQUENCY DRIVES

A. Description: NEMA ICS 2, variable-frequency controller, listed and labeled as a complete unit and arranged to provide variable speed of a standard NEMA MG 1, Design B, 3-phase, induction motor by adjusting output voltage and frequency. Provide VFD for each motor/pump as decribed and outlined in the construction documents.

B. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

C. Isolation Transformer: Match transformer voltage ratings and capacity to system and motor voltages; and controller, motor, drive, and load characteristics.

D. Output Rating: 3-phase, 6 to 60 Hz, with voltage proportional to frequency throughout voltage range.

E. Starting Torque: 100 percent of rated torque or as indicated.

F. Speed Regulation: Plus or minus one percent.

G. Ambient Temperature: 0 to 40 deg C.

H. Efficiency: 95 percent minimum at full load and 60 Hz.

I. Isolated control interface allows controller to follow 1 of the following over an 11:1 speed range:

1. Electrical Signal: 4 to 20 mA at 24 V.
2. Pneumatic Signal: 3 to 15 psig (20 to 100 kPa).

J. Internal Adjustability: Include the following internal adjustment capabilities:

1. Minimum Speed: 5 to 25 percent of maximum rpm.
2. Maximum Speed: 80 to 100 percent of maximum rpm.
3. Acceleration: 2 to 22 seconds.
4. Deceleration: 2 to 22 seconds.
5. Current Limit: 50 to 110 percent of maximum rating.

K. Multiple-Motor Capability: Controller suitable for service to multiple motors and furnished with a separate overload relay and protection for each controlled motor. Shut off the controller and motors served by it when an overload relay is tripped.

L. Self-protection and reliability features include the following:

1. Input transient protection by means of surge suppressors.
2. Snubber networks to protect against malfunction due to system voltage transients.
3. Motor Overload Relay: Adjustable and capable of NEMA250, Class 10 performance.
4. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
5. Instantaneous overcurrent trip.
6. Loss of phase protection.
7. Reverse phase protection.
8. Under- and overvoltage trips.
9. Overtemperature trip.
10. Short-circuit protection.

M. Automatic Reset/Restart: Attempt 3 restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Restarting during deceleration will not damage controller, motor, or load.

N. Power-Interruption Protection: Prevents motor from reenergizing after a power interruption until motor has stopped.

O. Status Lights: Door-mounted LED indicators to indicate the following conditions:

1. Power on.
2. Run.
3. Overvoltage.
4. Line fault.
5. Overcurrent.
6. External fault.

P. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer and elapsed time meter.

Q. Indicating Devices: Meters or digital readout devices and selector switch, mounted flush in controller door and connected to indicate controller output current, voltage, and frequency.

R. Manual Bypass: Magnetic contactor arranged to safely transfermotor between controller output and bypass controller circuit when motor is at zero speed. Controller-off-bypass selector switch indicator lights set and indicate mode selection.

S. Integral disconnect.

T. Bypass Controller: NEMA ICS 2, full-voltage, nonreversing motor controller, provides across-the-line starting capability in manual bypass mode. Provide motor overload protection under both modes of operation with control logic that allows common start-stop capability in either mode.

U. Isolating Switch: Non-load-break switch arranged to isolate variable-frequency controller and permit safe troubleshooting and testing, both energized and de-energized, while motor is operating in bypass mode.

V. Remote Indicating Circuit Terminals: Mode selection, controller status, and controller fault.

2.7 FEEDER OVERCURRENT PROTECTION

A. Molded-Case Circuit Breaker: NEMA AB 1, handle lockable.

1. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting capacity rating to meet available fault current.
2. Application Listing: Appropriate for application, including Type HACR for heating, air-conditioning, and refrigeration equipment.
3. Circuit Breakers, 200 A and Larger: Trip units interchangeable within frame size.
4. Circuit Breakers, 400 A and Larger: Field-adjustable, short-time and continuous-current settings.
5. Current-Limiting Trips: Where indicated, let-through ratings less than NEMA FU 1, Class RK-5.
6. Current Limiters: Where indicated, integral fuse listed for circuit breaker.
7. Lugs: Mechanical lugs and power-distribution connectors for number, size, and material of conductors indicated.
8. Shunt Trip: Where indicated.

B. Fusible Switch: NEMA KS 1, Type HD, clips to accommodate specified fuses, handle lockable.

2.8 ACCESSORIES

A. Devices are factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Stop and Lockout Push-Button Station: Momentary-break push-button station with a factory-applied hasp arranged so a padlock can be used to lock push button in depressed position with control circuit open.

D. Control Relays: Auxiliary and adjustable time-delay relays.

E. Elapsed Time Meters: Heavy duty with digital readout in hours.

F. Meters: Panel type, 2-1/2-inch (60-mm) minimum size with 90- or 120-degree scale and plus or minus 2 percent accuracy. Where indicated, provide transfer device with an off position. Meters indicate the following:

1. Ammeter: To indicate output current, with current sensors rated to suit application.
2. Voltmeter: To indicateoutput voltage.
3. Frequency Meter: To indicate output frequency.

G. Phase-Failure and Undervoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection. Provide adjustable undervoltage setting.

H. Current-Sensing, Phase-Failure Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage. Provide adjustable response delay.

I. Transient Voltage Surge Suppressors: IEEE C62.41, selected to meet requirements for a high exposure category.

J. Impulse sparkover voltage coordinated with system circuit voltage.

K. Factory mounted with a Nationally Recognized Testing Laboratory listed and labeled mounting device.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Select features of each motor controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

C. Push-Button Stations: In covers of magnetic controllers for manually started motors where indicated, start contact connected in parallel with sealing auxiliary contact for low-voltage protection.

D. Hand-Off-Automatic Selector Switches: In covers ofmanual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment.

3.2 INSTALLATION

A. Install motor-control centers according to NEMAICS 2.3 and manufacturer's written instructions.

B. Anchor each motor-control center assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by tack welding or bolting. Level and grout sills flush with motor-control center mounting surface.

C. Install motor-control centers on concrete housekeeping bases conforming to Division 3 Section "Cast-in-Place Concrete."

D. Fuses: Install fuses in each fusible switch as indicated.

3.3 IDENTIFICATION

A. Identify field-installed wiring and components and provide warning signs according to Division 16 Section "Basic Electrical Materials and Methods."

B. Identify field-installed wiring and components and provide warning signs according to Division 16 Section "Electrical Identification."

C. Operating Instructions: Frame printed operating instructions for motor-control centers, including control sequences, and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of motor-control center.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between motor-control devices according to Division 16 Section "Wires and Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic control devices according to an indicated wiring diagram or one that is manufacturer approved, where available.

1. Connect selector switches to bypass only the manual and automatic control devices that have no safety functions when switch is in the hand position.
2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.5 CONNECTIONS

A. Tighten motor-control center bus joint, electrical connector, and terminal bolts according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Provide services of a qualified independent testing agency to perform specified testing.

B. Testing: After installing motor-control center and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Sections 7.5, 7.6, and 7.16. Certify compliance with test parameters.
2. Remove and replace malfunctioning units with new units, and retest.

3.7 CLEANING

A. Inspect interior and exterior of motor-control centers. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally, using methods and materials recommended by manufacturer.

3.8 DEMONSTRATION

A. Training: Engage a factory-authorized service representative to demonstrate solid-state and variable-speed controllers and motor-control centers, and train Owner's maintenance personnel.

1. Conduct a minimum of 4 hours of training in operation and maintenance as specified in Division 1 Section "Contract Closeout." Include training relating to equipment operation and maintenance procedures.
2. Schedule training with at least 7 days' advance notice.

END OF SECTION

11268 Reservoir Hydrodynamic Mixing System (HMS)

1.0 General

1.1. The Hydrodynamic Mixing System (HMS) is defined as a supplemental system installed within a potable water storage reservoir which passively utilizes the energy provided by the inlet water supply (via pumped or gravity head) and generates a sufficient inlet momentum to achieve a complete homogeneous blending of the water volume within the reservoir with the inlet supply flow. Determination of Complete Homogeneous Blending shall be defined by the modeling requirements and supporting hydraulic analysis as conducted by each individual manufacturer for their specific system configuration as defined within these specifications. System submittals not providing this validation shall not be considered as a viable Hydrodynamic Mixing System (HMS) and shall not be accepted as an equivalent to this system specification.

1.2. The specifications in this section include all components of the Reservoir Hydrodynamic Mixing System (HMS) consisting of a bi-directional flow manifold equipped with variable orifice duckbill inlet nozzles and outlet flow check valves that are NSF61 certified. The HMS manufacturer shall be responsible for designing the system in accordance with the hydrodynamic criteria defined within these specifications and submit design calculations verifying compliance in accordance with the submittal requirements. The following is a description of the Hydrodynamic Mixing System.

1.3. All modeling and hydraulic and mixing calculations pertaining to the HMS shall originate from the duckbill valve manufacturer. Modeling and calculations provided by parties other than the duckbill valve manufacturer are not allowed.

1.4. The complete Hydrodynamic Mixing System shall be supplied by the variable orifice nozzle manufacturer to maintain single source responsibility for the system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include pipe, fittings, horizontal and vertical pipe supports, expansion joints, variable orifice duckbill check valves, and any other equipment specified within this section of the specifications. Approved manufacturer is Tideflex Technologies, Carnegie, PA 15106

2.0 Referenced Standards

American National Standards Institute (ANSI)
B16.1 – Cast Iron Pipe Flanges and Flanged Fittings
B16.5 – Pipe Flanges and Flanged Fittings
B36.10 – American National Standard Weights and Dimensions of Welded and Seamless Wrought Steel Pipe

American Society for Testing and Materials (ASTM)
A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A234 – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
A351 – Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts

A536 – Standard Specification for Ductile Iron Castings
C110 – Ductile Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water
D1330 – Standard Specification for Rubber-Sheet Gaskets
D1784 – PVC/CPVC Pipe Compounds
D1785 – PVC Pipe, Schedules 40, 80 & 120
D2466 – PVC Solvent Cement
D2855 – PVC Solvent Joints
D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Fittings
D3915 – PVC Pipe Fitting Compounds

American Iron and Steel Institute (AISI)
AISI 304 – 304 Stainless Steel Plate
AISI 316 – 316 Stainless Steel Plate
AISI 1040 – Carbon Steel Plate

American Water Works Association (AWWA)
C104 – Cement-Mortar Lining of Ductile Iron Pipe and fittings for Water
C110 – Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water
C115 – Flange Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
C200 - AWWA Standard for Steel Water Pipe 6” and Larger
C207 – Standard for Steel Pipe Flanges for Waterworks Service – Size 4 In. to 144 In.
C220 – AWWA Standard for Stainless Steel Pipe, 4” and Larger
C900 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. for Water Distribution
C905 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In Through 48 In. for Water Transmission and Distribution
C906 – AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In. for Water Distribution

American Water Works Association Research Foundation (AwwaRF)
Project No. E20-J08 – Physical Modeling of Mixing in Water Storage Tanks (Forthcoming)

National Sanitation Foundation (NSF)
NSF Standard 14 – Plastic Piping System Components and Related Materials
NSF Standard 61 – Drinking Water System Components – Health Effects

3.0 Variable Orifice Duckbill Inlet Nozzles

3.1. Inlet ports/nozzles shall be duckbill-style check valves that allow fluid to enter the reservoir during fill cycles and prevent flow in the reverse direction through the nozzle during draw periods. Inlet ports/nozzles may not be fixed-diameter ports or pipes.

3.2. The duckbill valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.

3.3. Inlet ports/nozzles shall have a variable diameter vs. flow hydraulic profile that provides a non-linear jet velocity vs. flow characteristic and a linear headloss vs. flow characteristic. The hydraulic characteristics of the duckbill valves shall be defined by “Hydraulic Code”.

3.4. The inlet ports/nozzles shall discharge an elliptically shaped jet. The nozzle must have been modeled by an independent laboratory using Laser Induced Fluorescence (LIF).

3.5. Manufacturer shall have conducted independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2" through 48". The testing must include multiple constructions (stiffness) within each size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.

3.6. Manufacturer shall have conducted an independent hydraulic test where multiple valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability of the manufacturing process to produce the same hydraulic characteristics.

3.7. Manufacturer shall have conducted independent hydraulic testing to study the flow distribution characteristics of duckbill valves installed on multiport manifolds.

3.8. Manufacturer to have conducted Finite Element Analysis (FEA) on various duckbill valves to determine deflection, stress, and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

3.9. Manufacturer must have conducted in-house backpressure testing on duckbill valves ranging from ¾" to 48".

3.10. Manufacturer shall have at least fifteen (15) years experience in the manufacturing of "duckbill" style elastomeric valves.

3.11. Manufacturer must have duckbill valves installed on manifold piping systems in at least 100 distribution system reservoirs.

3.12. Manufacturer must have representative inspection videos showing the duckbill valves discharging water into the reservoir during an initial fill (unsubmerged). Manufacturer must also have representative underwater inspection videos showing the operation of the valves when submerged. Representative videos can be submitted upon request from the engineer.

3.13. The duckbill style nozzles shall be one-piece elastomer matrix with internal fabric reinforcing designed to produce the required discharge velocity and minimum headloss requirements as stipulated in the Submittals section. The flange portion shall be an integral portion of the nozzle with fabric reinforcing spanning across the joint between the flange and nozzle body.

3.14. The elastomer used in construction of the duckbill valves must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."

3.15. The manufacturer's name, plant location, serial number and product part number which designates nozzle size, material and construction specifications shall be bonded onto the surface of the nozzle.

4.0 Outlet Check Valves

4.1. The outlet flow valves shall be perforated disc type with elastomeric membrane.

4.2. The valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.

4.3. The perforated disc shall be fabricated of stainless steel plate with welded support gussets. The disc shall be flanged and drilled to mate with ANSI B16.1, Class 125/ANSI B16.5 Class 150 flanges. The disc shall have three (3) tapped holes used for fastening the membrane and support rod to the disc with stainless steel bolts, nuts, and lock washers. The top of the disc shall be tapped and supplied with lifting eyebolt for installation.

4.4. The membrane shall be circular, one piece rubber construction with fabric reinforcement. The diameter of the membrane shall allow adequate clearance between the membrane O.D. and the pipe I.D. The membrane shall be vulcanized with a specified convex radius to produce a compression set to allow the membrane to seal against the perforated disc at low reverse differential pressure.

4.5. The support rod shall be stainless steel and drilled with three (3) longitudinal holes to allow fastening of rod to membrane and perforated disc.

4.6. When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the membrane to open, allowing flow to pass through the perforations in the disc. When backpressure exceeds the line pressure, the membrane seats on the perforated disc preventing backflow.

4.7. The valve allows flow out of the reservoir during draw cycles and prevents flow into the reservoir during fill cycles.

4.8. The elastomer used in construction of the membrane must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 “Standard Test Method for Rubber Property – Effect of Liquids.”

4.9. The manufacturer’s name, plant location, serial number and product part number which designates membrane size, material and construction specifications shall be bonded onto the surface of the membrane.

5.0 Polyvinyl Chloride (PVC) Pipe and Fittings

5.1. All PVC pipe and PVC fittings shall be a minimum Schedule 80 in accordance with ASTM D1785-83.

5.2. PVC pipe and fittings shall be NSF61 approved for potable water.

5.3. PVC pipe compounds shall be in accordance with the standards listed in Section 3.0: Referenced Standards.

5.4. PVC solvent and solvent joints shall be in accordance with the standards listed in Section 3.0: Referenced Standards.

5.5. Field solvent welding will not be allowed unless approved by the Engineer.

5.6. All pipe joints that are to be field connected shall be PVC Van Stone-type flanges. Flange drilling to be in accordance with ANSI B16.1/B16.5.

5.7. All fittings shall have the same pressure rating as the pipe unless otherwise noted.

6.0 High Density Polyethylene (HDPE) Pipe and Fittings

6.1. Two (2) Inches and Smaller – Pipe shall be manufactured from a PE3408 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE345464C. Pipe shall have a manufacturing standard of ASTM D2737 (CTS). Pipe shall be DR 9 (200psi WPR) unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, and per AWWA C901, have nominal burst values of three (3) times the Working Pressure Rating (WPR) of the pipe. Pipe shall also have the following agency listing of NSF 14.

6.2. Four (4) Inches and Larger - Pipe shall be manufactured from a PE3408 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE345464C. Pipe shall have a manufacturing standard of ASTM F714. Pipe O.D. sizes 4” to 24” shall be available in steel pipe sizes (IPS) and ductile iron pipe sizes (DIPS). Pipe O.D. sizes 26” to 54” shall be available in steel pipe sizes (IPS). Pipe shall be DR 17 (100psi WPR) for pipe sizes up to 36” unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, listed as NSF 14, and per AWWA C906 Pressure Class (PC) 100 have a nominal burst value of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the pipe.

6.3. Pipe fittings and flanged connections, to be joined by thermal butt-fusion, shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier.

6.4. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer’s specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.

6.5. Field fusion welding will not be allowed unless specified or approved by the Engineer.

6.6. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

6.7. Butt Fusion Fittings - Fittings shall be PE3408 HDPE, Cell Classification of PE345464C as determined by ASTM D3350-99, and approved for AWWA use. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261. Molded & fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings are to be manufactured using Data Loggers. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records. All fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the fitting.

6.8. Electrofusion Fittings - Fittings shall be PE3408 HDPE, Cell Classification of PE345464C as determined by ASTM D3350-99. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the fitting.

6.9. Flanged pipe sections for mechanical joining shall be comprised of HDPE flange adapters and Stainless Steel 304 slip-on backup rings. Flange adapters shall conform to PE3408 HDPE, Cell Classification PE345464C as determined by ASTM D3350-99.

7.0 Ductile Iron Pipe and Fittings

7.1. Flanged ductile iron pipe shall be Class 53 and conform to AWWA C115 / ANSI A21.15.

7.2. Flanges shall be faced and drilled after being screwed onto the pipe and be 90 degrees with the longitudinal axis of the pipe.

7.3. Flanged ductile iron fittings shall conform to AWWA C110 / ANSI A21.10.

7.4. Pipe and fitting flanges shall be drilled to ANSI B16.1 Class 125 standards.

7.5. All flanged pipe and fittings shall be cement-mortar lined conforming to AWWA C104 / ANSI A21.4.

7.6. All flange pipe and fittings shall be shop-coated with an NSF61 Certified primer, 3-5 mils DFT. Paint shall be Tnemec 20 Pota-Pox or Tnemec N140 Pota-Pox Plus unless otherwise specified. Coating shall be in accordance with coating manufacturer's specifications.

8.0 Carbon Steel Pipe and Fittings

8.1. Carbon steel pipe and fittings shall conform to the associated standards listed in Section 3.0: Reference Standards.

8.2. Dimensions for carbon steel fittings shall conform to AWWA C110, unless otherwise specified.

8.3. Wall thickness for carbon steel pipe and fittings shall be specified by Schedule conforming to ANSI B36.10-1985.

8.4. Wall thickness and dimensions of carbon steel tubing shall be given in exact dimensions in fractions of an inch, not by gage number.

8.5. All flanges shall be carbon steel ring flanges conforming to AWWA C207 Class D. Flange drilling pattern shall be in accordance with ANSI B16.1/B16.5 standards.

8.6. Ring flanges shall be continuously welded on both sides.

8.7. Welding of carbon steel pipe and fittings shall be in accordance with the Reference standards.

8.8. All butt welds shall be fully penetrated with gas shielding to the interior and exterior of the joint.

8.9. Welded cross-sections shall have a thickness equal to or greater than the welded material.

8.10. Field welding of carbon steel pipe and fittings will not be allowed unless approved by the Engineer.

8.11. All welded joints shall be free of sharp edges and burrs.

8.12. Coating of the inside of carbon steel pipe and fittings is not required, unless otherwise specified.

8.13. Coating of the outside of carbon steel pipe and fittings shall be performed in the field, by the contractor, following installation of the manifold piping system. Surface preparation and coating procedures shall be in accordance with standards listed in Coatings specification.

9.0 Stainless Steel Pipe and Fittings

9.1. Stainless steel pipe and fittings shall conform to the associated standards listed in Section 3.0: Reference Standards.

9.2. Dimensions for stainless steel fittings shall conform to AWWA C110, unless otherwise specified.

9.3. Piping shall be Schedule 10s stainless steel 304L fabricated from material per ASTM-A240.

9.4. All flanges shall be plate ring flanges. Flange drilling pattern shall be in accordance with ANSI B16.1/B16.5 standards.

9.5. Ring flanges shall be continuously welded on both sides.

9.6. All shop welds shall be manually scrubbed or brushed with non-metallic pads or stainless steel wire brushes to remove weld discoloration. Welds to be chemically passivated with nitric or citric acid.

9.7. Field welding of stainless steel pipe and fittings will not be allowed unless approved by the Engineer.

10.0 Flange Gaskets

10.1. Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330.

10.2. Flange gasket drilling pattern shall conform to ANSI B16.1/B16.5.

10.3. Flange gaskets shall be 1/8" thick.

10.4. Gasket material shall be EPDM.

11.0 Fasteners

11.1. Hex head bolts and nuts shall be carbon steel conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2.

11.2. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar bolt and flange metals where required.

12.0 Pipe Supports

12.1. All components of the bracket assembly shall be carbon steel in accordance with the associated standards.

12.2. The bracket assemblies shall consist of four components:

12.2.1. A base plate (when required). For concrete tanks, the base plate will have four thru holes for expansion anchors.
12.2.2. A top-works weldment that consists of structural channel and angle iron. The TMS piping shall rest on the angle iron. The angle iron has predrilled holes for the U-bolt.
12.2.3. U-bolt with four hex nuts.
12.2.4. An 1/8" thick EPDM strip with a length equivalent to the circumference of the pipe. The strip shall be placed between the pipe and the angle iron and U-bolt.

12.3. The channel of the top-works weldment shall be field fit and modified to the required length. The channel shall then be field welded to the base plate.

12.4. For steel tanks, the base plate shall be field welded to the tank floor or shell. The location of the base plate shall avoid welded joints in the floor/shell plates.

12.5. For concrete tanks, the support shall be anchored to the concrete floor with stud type expansion anchors, the pull-out rating of the combined anchors shall be a minimum of 10 times greater than the static weight of the vertical pipe section.

12.6. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar metals where required.

13.0 Coatings

13.1. Following installation of the manifold system, all carbon steel and ductile iron pipe, fittings, bolted connections, pipe supports, and appurtenances shall be coated according to the interior tank paint specification as specified by the Engineer.

13.2. Surface preparation and coating procedures shall be provided by the Engineer and the coating supplier.

13.3. **Tideflex and Waterflex Valves shall not be coated**. The valves shall either be masked or be mounted after coating of the tank and piping. Contractor to ensure masking materials are removed after coating.

14.0 Delivery, Storage, and Material Handling

14.1. Individual nozzles and outlet valves shall be packaged separately from the piping equipment.

14.2. All flanges shall be protected by using plastic inserts or plank wood, pipe sections are to be fully supported to prevent pipe deflection or damage to fittings or connections.

14.3. All equipment shall be shipped on pallets capable of fully supporting the pipe sections across their entire length. Pallets should be accessible for fork lift transport or strap and hoist means without causing any load to the pipe equipment.

14.4. All stainless steel components shall be stored separately away from any carbon steel components or other materials that could stain or deface the stainless steel finish from run-off of oxidized ferrous materials.

14.5. All pipe equipment should be covered and stored in areas free from contact with construction site sediment erosion to prevent accumulation of materials within the pipe and fittings.

14.6. Duckbill nozzles should be protected from contact with rigid objects during handling and storage. The contractor shall be responsible for replacing any duckbill nozzles or elastomeric components that are damaged after arrival on the site through installation and start-up of the system.

15.0 Submittals

15.1. Independent CFD Modeling Validation

15.1.1. The mixing system designer/supplier must supply data or report from at least one project where an independent company conducted CFD modeling on their mixing system design and the modeling results verified the design achieved complete mixing.

15.2. Full Scale Tracer Study Validation

15.2.1. The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on a circular reservoir and the tracer study results verified the mixing system design achieved complete mixing.

15.2.2. The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on an elevated tank and the tracer study results verified the mixing system design achieved complete mixing.

15.3. Tideflex Inlet Nozzle and Waterflex Outlet Valve Testing and Validation

15.3.1. Verification of independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2” through 48”. The testing must include multiple constructions (stiffness) within each

size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.

15.3.2. Verification of Independent Laboratory Testing for Manufacturing Consistency - the duckbill valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing where multiple duckbill valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability and consistency of the manufacturing process to produce the same hydraulic characteristics.

15.3.3. Report of independent testing that studied the flow distribution characteristics of duckbill valves installed on multiport manifolds. The manufacturer must have been in the business of manufacturing duckbill valves at the time the report was published.

15.3.4. Verification of Finite Element Analysis (FEA) of duckbill valves. The duckbill valve manufacturer shall provide summary documentation of Finite Element Analysis modeling on representative duckbill nozzle sizes to determine deflection, stress and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

15.3.5. Verification of independent hydraulic testing to determine headloss characteristics on a minimum of three (3) sizes of perforated disc/elastomeric membrane check valves ranging from 6” through 36”. Testing must have been conducted with and without the membrane installed. At least two (2) sizes shall have tested two (2) different membrane thicknesses.

15.3.6. Verification of Finite Element Analysis (FEA) modeling on a perforated disc/elastomeric membrane check valve to determine stress and deflection characteristics under reverse differential pressure.

15.4. Validation of Long-term performance

15.4.1. The mixing system designer/supplier must supply at least one inspection report showing proper operation of, and no deterioration of, the duckbill valves after being in service in a water storage tank mixing application for a minimum of 10 years.

15.5. NSF61 Certification

15.5.1. Copy of the NSF61 Certified listing for the valves used in the Hydraulic Mixing System (HMS).

15.5.2. The valves themselves must be NSF61 certified, not just the elastomer used in construction of the valves. NSF61 approved/certified materials will not be accepted in lieu of valve certification.

15.5.3. The NSF61 Certification for the valves must be for a minimum volume of 2,000 gallons. Valves with NSF61 Certification for minimum volume of greater than 2,000 gallons are not acceptable.

15.6. Test Report on Elastomer Exposure to Chlorine and Chloramine

15.6.1. Copy of test report from an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 “Standard Test Method for Rubber Property – Effect of Liquids.”

15.7. System Installation Drawings

15.7.1. The duckbill valve manufacturer shall be responsible for providing engineering installation drawings of the complete manifold piping system as supplied by the manufacturer. These drawings shall include plan view piping arrangement, sections and elevations as required, support bracket installation details, duckbill nozzle orientation details, and all dimensions required for locating the system within the specified dimensions
of the tank.

15.7.2. Six (6) sets of plans shall be provided to the Engineer for review and approval.

15.7.3. Two (2) sets of final fabrication and installation drawings shall be included with the shipment of the manifold piping equipment.

15.8. Design Calculations

15.8.1. All Design Calculations, curves, and reference information listed below must originate and be submitted by the duckbill valve manufacturer. **Calculations, curves, and reference information provided by contractors relating to the HMS are not allowed.** The duckbill valve manufacturer MUST include within the submittal package the following design calculations, curves, and reference information:

15.8.1.1. Calculations showing the fill time required, under isothermal conditions, for the HMS system to achieve complete mix of the reservoir volume at minimum, average and peak fill rates. Complete mixing defined as 95% homogenous solution. The theory and equations used in calculating the mixing times must be from a published AWWA reference manual or paper. The reference document(s) must be submitted with the equations and calculations.

15.8.1.2. Calculations showing the water level drawdown required to achieve complete mixing on the fill cycles at minimum, average, and peak flow rates.

15.8.1.3. Calculations of average storage tank water age for both fill-then-draw, and simultaneous fill and draw scenarios. Theory used in calculating water age must be submitted with the calculations.

15.8.1.4. A representative Computational Fluid Dynamics (CFD) model evaluation of the proposed HMS system configuration applied within a reservoir of similar geometry. Model output documentation shall include all design variables applied for the simulation, plot of the 3-D geometry showing the mesh definition, velocity magnitude vector and contour plots at different cross-sections throughout the water volume, simulated tracer animations showing the spatial and temporal distribution of inlet water in real time during the fill cycle.

15.8.1.5. Hydraulic calculations showing the resulting jet velocities of each inlet nozzle at minimum, average, and peak fill rates.

15.8.1.6. Hydraulic calculations showing the flow distribution among all inlet ports at minimum, average, and peak fill rates.

15.8.1.7. Manifold hydraulic calculations showing the total headloss of the HMS at minimum, average, and peak fill and draw rates. Headloss shall include all minor losses and headloss of nozzles and outlet check valves.

15.8.1.8. Hydraulic curves showing thrust vs. flow for the inlet nozzles.

15.8.1.9. Hydraulic curves for each outlet check valves showing headloss vs. flow.

15.8.1.10. Calculations showing the terminal rise height of the jets that discharge at an angle above horizontal. The terminal rise height shall be calculated assuming 10˚F and 20˚F colder inlet water and calculated at minimum, average and peak fill rates. The theory and equations used to calculate the terminal rise height shall be included.

15.8.1.11. Hydraulic curves for each inlet nozzle of Densimetric Froude number vs. flow

15.8.1.12. If the calculations and supporting data provided do not show compliance with the hydrodynamic requirements of the system as interpreted by the Engineer or Owner then the submittal shall be rejected.

15.9. Installation, Operation and Maintenance Manuals

15.9.1. Within 30 days of final approval of the installation drawings, by the Engineer, the HMS valve manufacturer shall provide four (4) sets of the installation portion of the Installation, Operation and Maintenance (IOM) Manuals for the applicable system. Within 30 days of final approval, by the Engineer, of the installed system the manufacturer shall provide six (6) copies of the complete Installation, Operation and Maintenance (IOM) Manual for final review and approval.

15.9.2. The manuals shall be in the following format and include the listed required information as a minimum:

Enclosed in a 3-ring binder with project title and system designation shown on the front cover and side binder.

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Copy of design calculations for the manifold system as defined in the previous section.

Copy of complete set of the installation plans.

Copy of NSF61 Certified Listing for the valves

Parts and equipment list with specification numbers for ordering of replacement parts.

Product specification sheets for nozzles, outlet valves, expansion joints, concrete anchors, and any other specialized items supplied with the system.

Installation guidelines for the HMS manifold system.

Operational procedures for the HMS manifold system.

Guidelines for repair of system components.

Schedule for suggested periodic maintenance of the manifold system.

16.0 Installation

16.1. Installation of the manifold system shall be in accordance with the installation plans and guidelines provided by the HMS manufacturer and as specified in the installation section of the IOM manual. Refer to section on Submittals for quantities and delivery schedules of the documents.

17.0 Installation Inspection and Start-Up Testing Procedures

17.1. The TMS manufacturer's authorized representative shall provide one (1) day inspection to verify that the system has been installed in accordance with the design specifications and installation drawings.

17.2. Start-Up Flow Testing

17.2.1. Following installation of the complete manifold piping system, the contractor shall open the upstream isolation valve to allow flow into the tank through the manifold system. The isolation valve must be opened slowly to prevent surge or over-pressurization of the manifold system. The isolation valve must be fully opened to inspect the flow characteristics of the manifold system.

17.2.2. The contractor and factory representative shall visually inspect the entire piping system for leakage.

17.2.3. The contractor and factory representative shall visually inspect all of the inlet nozzles to ensure flow is being discharged into the tank through all nozzles.

18.0 Spare Parts

18.1. Spare parts are not required, unless otherwise specified.

19.0 Warranty

19.1. The complete manifold piping system shall be supplied by the HMS manufacturer to maintain single source responsibility for the system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include pipe, fittings, horizontal and vertical pipe supports, expansion joints, duckbill valves, and any other equipment specified within this section of the specifications.

19.2. All piping, pipe support brackets, joint connections, expansion joints, and anchors shall be warranted by the HMS manufacturer against failure under design conditions for a period on one (1) year from the date of final installation approval by the Engineer.

19.3. Inlet nozzles and outlet valves shall be warranted by the manufacturer against failure under design operating conditions for a period of one (1) year from the date of final installation approval by the Engineer. Elastomer components damaged as a result of maintenance activities, foreign debris, or excessive exposure to direct ultraviolet and thermal radiation shall be excluded warranted coverage.

End of Section

SECTION 09920 - WATER STORAGE TANK COATING

PART 1 - GENERAL

1.1 Work Included

The Contractor shall furnish all labor, material and equipment of any kind required to perform repairs, sandblasting, cleaning and painting on the project as hereinafter set forth. The Contractor shall provide materials and labor to produce a first class job. Painting shall be performed at such times and in such places as the Contractor and Engineer may agree upon in order that dust-free, professional and neat work shall be obtained. All painting shall be done in strict accordance with these specifications, recommendations of the manufacturer and shall be performed in a manner satisfactory to the Engineer.

The existing “Frames Branch Tank” is a 100,000 Gallon Welded Steel Tank constructed in 1988. The height to overflow is 24 ft. The interior coating is an epoxy system which tested negative for lead. The exterior coating is an acrylic which tested negative for lead.

1.2 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications referred to in text by the basic designation only.

American Water Works Association, Inc. (AWWA) Standards:

D100-Latest Revision	Welded Steel Tanks for Water Storage
D101-Latest Revision	Repairing Steel Water Tanks for Water Storage
D102-Latest Revision	Painting Steel Water Storage Tanks

Steel Structures Painting Council (SSPC) Specifications:

SSPC-SP 1 Solvent Cleaning
SSPC-SP 2 Hand Tool Cleaning
SSPC-SP 3 Power Tool Cleaning
SSPC-SP 6 Commercial Blast Cleaning
SSPC-SP 10 Near White Blast Cleaning

1.3 Quality Assurance

Performance Certification: Submit a performance affidavit certifying to the Owner that:

1. The Contract documents have been fully examined.

2. Coating systems of the type specified herein have been applied by the firm on at least 5 similar elevated water storage tanks within the past 10 years. Contractor shall provide references including contact names and phone numbers for each of the 5 tank projects on the Bidders Qualification forms. Contacts must be accessible for verification. If in doubt, provide additional projects and contacts. Failure to provide the information or providing information that does not yield a verifiable refe rence may be grounds for rejection of the bid proposal.

3. The Workmen and their Supervisor have knowledge of and are familiar with the coating systems specified herein from the standpoints of required environmental, safety and health conditions during application and curing.

Utilize quality assurance procedures and practices to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Director’s Representative.

Provide materials for each system type from a single manufacturer.

Coating systems shall conform to all current A.W.W.A. Standards and carry appropriate N.S.F. (National Sanitation Foundation) approval in accordance with Standard 61 for Coatings and Linings.

PART 2 – PRODUCTS

2.1 Material

A. Requirements for Interior Coating System:

A. Type: Polyamide Epoxy
B. Solids by volume: 54% Minimum.
C. ASTM D-3359 Method B, Class. 5B
D. ASTM B-117-73 Salt Spray (Unscribed): 8,760 Hours.
E. ASTM D-3363-74 Pencil Hardness.
F. ASTM D-522 Elongation - 1/2 inch Mandrel
G. ASTM D-2794 Direct Impact (16 Gauge Panel)
H. ASTM A-4060 CS-17 WHEEL, 1,000 Cycles, CS-17 Wheel.
I. ASTM 96-66 @ 4.88 mils DFT
J. Immersion -Distilled Water: 56,000 Hours
K. Immersion - Jet Fuel: 31,000 Hours.
L. Immersion - Gasoline: 14,400 Hours
M. Immersion - Mineral Oil: 31,000 Hours.

B. Requirements for Exterior Coating System (Primer):

A. Primer Type: Water Borne Rust Inhibitive Acrylic Primer.
B. Solids by volume: 38% Minimum.
C. ASTM D3359 Method B. Substrate: Steel
D. ASTM D 522-88 Method A (Mandrel Flex): 1/4 Inch Diameter Bend.
E. Impact resistance: ASTM D2794. Substrate: Hot Rolled Steel.
F. ASTM B-117 Salt Spray (Fog): 500 Hours.
G. Chemical Resistance (Spot Testing - 300 Hours)
    Distilled Water
    5% Salt Water
    10% Sodium Hydroxide
    50% Sodium Hydroxide
    Propylene Glycol
    Motor Oil.

C. Requirements for Exterior Coating System (Finish):

A. Finish type: Water Borne Acrylic Enamel
B. Solids by volume: 36% Minimum.
C. ASTM D3359 Method B. Substrate: Steel
D. ASTM D 522-88 Method A (Mandrel Flex): 1/4 Inch Diameter Bend.
E. Impact resistance: ASTM D2794. Substrate: Hot Rolled Steel.
F. ASTM B-117 Salt Spray (Fog): System: Primer and Finish: 500 Hours.
G. Chemical Resistance (Spot Testing - 300 Hours)
    Distilled Water
    5% Salt Water
    10% Sodium Hydroxide
    50% Sodium Hydroxide
    Propylene Glycol
    Motor Oil.
H. Elcometer Adhesion: Substrate: 5 Year Old Alkyd Coating.
I. ASTM B 117 Salt Spray (Fog): System - 1.5 mils Aquanaut Finish Only - 500 Hours.
J. QUV: 1,000 Hours.

The paint used shall be Tnemec Pota-Pox Series 20, or equal. No request for substitution will be considered which decreases the film thickness and/or the number of coats to be applied, or which offers a change from the generic type of coating specified. Request for substitution shall contain the following:

A. Full name of each product
B. Descriptive literature
C. Directions for use
D. Generic type
E. Non volatile content by volume
F. Performance criteria as listed in these specifications.

Bidders desiring to use paints other than those specified shall submit their proposal based on the specified materials, together with the information noted above, and indicate the sum which will be added to or deducted from the base bid, should the alternate materials be acceptable. In no case will the request be considered unless received, in writing, ten days prior to the bid opening date.

2.2 Certifications

Protective coatings for interior wet application shall be listed by NSF International as approved for potable water contact in accordance with ANSI/NSF Std. 61, Section 5 Protective (Barrier) Materials.

2.3 Shipping, Storage and Handling

All paints shall be properly prepared by the manufacturer and delivered to the site for field painting in the original unbroken containers with manufacturer's label plainly printed thereon. Type of material to be applied at each location shall be submitted to the Engineer with the manufacturer's written recommendation of the type paint for each item to be painted.

All coatings shall be stored in an enclosed structure to protect them from weather and excessive heat or cold. Flammable coatings must be stored to conform to City, County, State and Federal safety codes for flammable coatings or paint materials. At all times coatings shall be protected from freezing.

PART 3 - EXECUTION

3.1 Environmental Conditions

No paint shall be applied when the air or surface temperature, as measured in the shade, is below that which is recommended by the manufacturer. Paint shall not be applied to wet or damp surfaces, and shall not be applied in rain, snow, fog, mist, or when the surface temperature will be less than 5 F above the dew point. No paint shall be applied when it is expected that the surface temperature will drop below the manufacturer's recommendation within 2 - 4 hours after the application of the paint. Dew or moisture condensation should be anticipated, and if such conditions are prevalent, painting shall be delayed until it is certain that the surfaces are dry. In addition, the days painting shall be completed well in advance of the probable time of day when moisture condensation will occur in order to permit the film the required drying time as specified by the manufacturer prior to the formation of moisture. Care must be exercised that the coatings are applied in the film thickness range recommended by the manufacturer and that adequate drying time is permitted between coats to assure proper release of solvents.

3.2 Workmanship

Workmanship shall be of first class quality. Finish painting shall show no drips, runs, sags, holidays, or other defects. The finish coat shall be free from noticeable laps or brush marks. Paint during application shall be continuously stirred. Paint shall be thoroughly worked into all joints, corners, and well brushed out over all surfaces. Should any coat or paint be judged unsatisfactory, the Contractor shall remove the coat(s) as necessary and repaint at no additional cost to the Owner.

3.3 Existing Utilities, Structures and Properties

It shall be the responsibility of the contractor to locate and avoid damage to any and all existing water, gas, sewer, electric, telephone, and other utilities, structures, businesses, residences, vehicles or appurtenances. The Contractor shall repair or pay for all damages caused by his operations or his personnel to existing utilities, structures, appurtenances, or properties, either below ground or above ground and shall settle in full all damage suites which may arise as a result of his operations. Contractor shall have seen the site prior to his bid. It is the contractor's responsibility to make certain that site conditions and adjacent property locations will be fully known. Contractor will be fully and solely responsible and remedy any overspray or fugitive debris claims that could potentially arise from his operations to complete the work prescribed herein.

3.4 Ventilation

It is essential that the solvent vapors released during and after application of coatings be removed from the tank. During coating application the capacity of ventilating fans shall be at least 300 cfm per gallon of coating applied per hour. Continuous forced ventilation at a rate of at least one complete air change per 4 hours shall be provided for at least 7 days after coating application is completed. Air shall be exhausted from the lowest portions of the tank with the top openings kept open and clear. A minimum of seven days following application of the final coat on the interior shall be allowed before the tank is sterilized or filled with water.

3.5 Testing Equipment and Procedures

The Contractor shall have on the project site the following testing equipment. Equipment shall be in calibration and proper working order. Equipment shall be used in accordance with the manufacturers' instructions or as directed by the Engineer. The Engineer shall be notified of time of testing so that he might be present to witness testing. The Contractor shall keep a daily log of environmental conditions, work schedule, and any other pertinent information. The log shall be turned over to the Owner at the end of the project to be included in the permanent record.

A. Sling Psychrometer: Relative humidity and dew point readings shall be taken at intervals throughout the days work. Readings shall be taken at the start of the mornings work, mid day and afternoon. Should environmental conditions change, additional reading shall be taken to assure that coatings are being applied under the conditions as outlined by the coatings manufacturer.

B. Surface Temperature Thermometer: Surface temperatures shall be taken in areas where work is being performed. Surface temperature shall be that as specified by the coatings manufacturer.

C. Replica Tape & Micrometer: Testex X-Course Replica Tape shall be employed to determine the surface profile of blasted surfaces. Surface profile shall be as specified.

D. Dry Film Thickness Measurements: Dry film thickness reading shall be taken with a properly calibrated (per the manufacturer's instructions) Type 1 (magnetic) or Type 2 (electromagnetic) instrument. Dry film thickness reading will be taken and recorded in the in a frequency and manner as dictated by the Engineer.

E. Holiday Detection: After completion of the interior coating system, interior surfaces shall be holiday detected in accordance with ASTM G 62 low voltage holiday detection. Holiday detector shall be a Tinker & Rasor Model M-1 or equal. Areas found to have holidays shall be marked and repaired in accordance with the paint manufacturer's instructions. The Engineer shall be notified of time of testing so that he might be present to witness testing. The Contractor shall provide ladders, rigging, etc. as necessary to allow the Engineer to spot check paint thickness of each coat.

3.6 Surface Preparation

Prior to surface preparation, all surfaces shall be free of or clean all oil and grease in accordance with SSPC-SP 1 Solvent Cleaning.

Special Note: Initial test results have yielded negative for lead for this tank. Contractor shall make the final tests for lead and perform the sandblasting and tank preparations in accordance with the findings and all applicable Federal, State and Local regulations at no additional cost to the owner. Contractors are reminded of fugitive emission limitations and regulations.

All interior surfaces shall be sand blasted to remove all dust, rust and scale, as well as all other foreign matter and shall result in a surface preparation equal to that of an SSPC-SP 10 Near White Blast Cleaned Surface. Surface profile shall be 1.5 - 2.5 mils.

All exterior surfaces shall be sand blasted to remove all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter. Random staining shall be limited to no more than 33 percent of each unit area of surface and may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coating. All areas of peeling, flaking, or otherwise failing paint shall be cleaned in accordance with SSPC-SP 6 Commercial Blast Cleaning. All edges shall be feathered.

All field surface preparation shall be in accordance with the applicable SSPC specification and be approved by the Engineer before primer is applied. Contractor shall request acceptance of each coat before applying the next coat and shall correct work that is not acceptable and request re-inspection. All rigging is to remain in place and Contractor shall aid in the use of rigging for all inspections.

Following surface preparation, all interior and exterior surfaces shall be coated as hereinafter specified. The primer shall be applied in accordance with the recommendations of the manufacturer and not more than eight hours after surface preparation.

3.7 Coatings

A. Interior

1. Prime: All interior surfaces shall receive one full prime coat of Induron PE-54 Epoxy Primer applied at a rate to achieve 3.0 - 5.0 dry mils. Color: Tan.

2. Seam Treatment: Following prime coat, all weld seams, ladders, sharp edges, and any other difficult to coat areas shall receive one coat of Induron PE-54 Epoxy Primer applied, by brush, at a rate to achieve 2.0 - 4.0 dry mils. Color: White.

3. Intermediate: All surfaces shall receive one full coat of Induron PE-54 Epoxy applied at a rate to achieve 3.0 - 5.0 dry mils. Color: Gray.

4. Finish: After proper cure of the Intermediate coat, all interior surfaces shall receive one full coat of Induron PE-54 Epoxy applied at a rate to achieve 3.0 - 5.0 dry mils. Color: White.

5. The interior coating systems shall have a total dry film thickness of not less than 12.0 dry mils or greater than 15.0 mils.

B. Exterior

1. Spot Prime: All exterior surfaces which have been cleaned to bare metal shall be primed with one coat of Induron Induramastic 85 applied at a rate to achieve 4.0 - 6.0 dry mils. Color: Tan.

2. Intermediate: After spot priming, all exterior surfaces shall receive one full

intermediate coat of Induron Aquanaut Acrylic Finish applied at a rate to achieve 1.5 - 3.0 dry mils. Color: As Selected.

3. Finish: Following the intermediate coat, all exterior surfaces shall receive one full finish coats of Induron Aquanaut Acrylic Finish applied at a rate to achieve 1.5 - 3.0 dry mils. Color as selected by Owner.

4. The exterior coating system shall have a minimum dry film thickness of 4.0 dry mils (excluding the existing coating).

5. Lettering: Lettering and/or logos shall be located in accordance with the drawings and shall be applied using two coats of Induron Aquanaut Acrylic Finish applied at a rate to achieve 1.5 - 2.5 dry mils per coat. Color as selected by Owner.

3.8 Damaged Coatings

Damaged coatings, pinholes, and holidays shall have edges feathered and repaired in accordance with the recommendations of the manufacturer, as approved by the Engineer. All finish coats, including touch up and damage-repair coats shall be applied in a manner which will present a uniform texture and color-match appearance.

3.9 Unsatisfactory Application

If the item has an improper finish, color, or insufficient film thickness, the surface shall be cleaned and top coated with the specified material to obtain the specified color and coverage. Specific surface preparation information to be secured from the coatings manufacturer and the Engineer.

All visible areas of chipped, peeled, or abraded paint shall be hand or power-sanded, feathering the edges. The areas shall then be primed and finish coated in accordance with the specifications.

Work shall be free of runs, bridges, shiners, laps, or other imperfections. Evidence of these conditions shall be cause for rejection.

Any defects in the coating system shall be repaired by the Contractor per written recommendations of the coating manufacturer.

3.10 Cleaning and Disinfection

A. Cleaning: After painting, remove all materials not a part of the structural or operational facilities of the tank from the premises.

B. Disinfecting: Upon completion of construction, disinfection shall be strictly in accordance with the procedure designated in the State Regulations, as follows: All new water distribution systems including storage tanks and repaired portions of, or all extensions to existing systems shall be thoroughly disinfected before being placed in service, by the use of chlorine or chlorine compounds in such amounts as to produce a concentration of at least fifty (50) ppm and a residual of at least twenty five (25) ppm at the end of 24 hours and followed by thorough flushing. An alternate method is to fill the tank with enough water (containing a free chlorine concentration of at least 250 mg/1) to spray all inside tank surfaces with the chlorinated water. Repeat the spraying again at no less than 1.0 hour from the end of the first spraying. Drain the tank at no less than 30 minutes from end of second spraying before filling for use.

C. Sampling and Testing: After the chlorination is complete and before the tank is placed into service, water from the full facility shall be sampled and tested in accordance wit AWWA D-100 and Kentucky Division of Water standards. Upon passing results the tank shall be placed into service. Upon failed sampling, the sterilizations shall be repeated at no additional cost to the Owner.

3.11 Cleanup

All cloths and waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site and/or destroyed in an approved and legal manner. Paint spots, oil, or stains upon adjacent surfaces and floors shall be completely removed, and the entire job left clean and acceptable to the Engineer.

3.12 Guarantee and Anniversary Inspection

In accordance with AWWA D102-97, Section 5.2, all work shall be warranted for a period of one year from the date of completion. The Owner will notify the Contractor at least 30 days prior to the anniversary date and shall establish a date for the inspection. The tank will be drained and the Owner's representative and the Contractor shall thoroughly inspect all surfaces both inside and out. Any defects in the coating system shall be repaired by the Contractor at no additional cost to the Owner. Should a failure occur to 20% of the painted surface, either interior or exterior, the entire surface shall be cleaned and repainted in accordance with these specifications.

End of Section

SECTION 03100 - CONCRETE FORMWORK

PART 1. GENERAL

1.1 Work Included

Forms shall be wood, steel, or other approved material. Wood forms shall be tongue-and-groove lumber of uniform width and thickness, or plywood having a minimum of five plies, a minimum thickness of 9/16 inch and a type made especially for concrete forms. Steel forms shall be of a type acceptable to, and commonly used in the construction field. The type, shape, size, quality and strength of all material of which the forms are made shall be subject to the approval of the Engineer.

1.2 Design, Inspection and Approval of Form Work

The design and engineering of the form work, as well as the construction, shall be the responsibility of the Contractor. The Engineer's approval of form work design and/or drawings, as submitted or as corrected in no way shall relieve the Contractor of his responsibility for adequately construction and maintaining the forms so that they will function properly.

Forms, form joints, and reinforcing steel placement shall be checked by the Engineer before closing up the forms. Concrete shall not be place in any form until the placing of steel and erection of form work have been completed and approved by the Engineer. Immediately after completion of pouring, tops of all forms shall be adjusted to line and approved by the Engineer as to conformity with the tolerances specified herein.

PART 2. PRODUCTS

2.1 Forms for Exposed Concrete

A. Unlined. The contact surface of forms shall be constructed from 5/8 inch or 3/4 inch 5 ply structural plywood of concrete form grade. All concrete form plywood shall be designated by grade marking each panel. Full sized sheets of plywood must be used except where smaller pieces will cover an entire area. The edges of all plywood sheets shall be straightened on the bench to insure close fitting, tight joints. All vertical joints shall be backed solidly and the edges of abutting sheet shall be nailed to the same stud.

Contact surfaces of forms shall be in good condition. The Engineer has the right to reject forms which will not produce a smooth, uniform, concrete surface.

B. Lined. The backing for form lining shall be constructed of a good grade of form lumber that is solid, straight and free from defects that might impair its strength but need not be of the quality used for contact forms. Square-edged, sized lumber may be used for form boarding in place of shiplap or tongue-and-groove.

The boarding for lined forms may be horizontal or vertical, depending upon convenience. Form sheathing shall be securely nailed to the studs and the edges of the boards shall be in contact to prevent any bulging of the lining.

Plywood faced panel or patented forms in good condition, with tight fitting joints, such as steel-ply forms, can be substituted for lined forms if a smooth wall surface, as required by these specifications, can be obtained. Minor variations in concrete texture at form joints will be permitted.

Lining material shall be 1/4 inch structural plywood securely nailed to the form sheathing. All lining material shall be used in as wide pieces as possible Areas less than 4 feet in width shall be lined with a single width of plywood.

Joints in lining and backing shall not occur at the same place and butting edges of adjacent sheets shall be nailed to the same board. The lining material shall be nailed to the backing beginning at center of the board and working toward the edges to prevent buckling. Lining material may be reused, if it is in satisfactory condition and is approved by the Engineer. Open joints which would permit leakage of grout shall be sufficient cause for rejection of forms. If, in the opinion of the Engineer, pointing of slightly open joints will prevent leakage, then such pointing shall be allowed.

In the case of line circular forms where the backing for form lining is constructed in chords of a circle, the form lining shall be adequately supported by variable thickness shim strips on at least 6 inch centers so that the liner forms a circular surface within tolerances specified herein.

2.2 Forms for Unexposed Concrete

Forms shall be constructed of a good grade of form lumber that is solid, straight and free from defects which might impair its strength, but need not be of the quality required for contact surfaces of forms for exposed concrete. Forms shall be of shiplap or T 7 G No. 2 wood sheathing, 3/4 inch plywood, 5/8 inch plywood or approved equal.

2.3 Form Ties

Form ties shall be as follows:

(a) "Water-Seal" type of ties shall be used for water holding structures or structures subject to flooding.

(b) Non-water holding structures, which are not subject to flooding, shall have ties approved by the Engineer.

Form ties shall have a minimum working strength when fully assembled of at least 3,000 pounds. Ties shall be so adjustable in length as to permit tightening of forms and of such type as to leave no metal closer than 1 inch from the surface and they shall not be fitted with any lugs, cones, washers, or other device to act as a spreader within the form or for any other purpose which will leave a hole larger than 7/8 inch in diameter of a depression back of the exposed surface of the concrete. Wire ties shall not be permitted.

PART 3. EXECUTION

3.1 Construction

Forms shall be true to line and grade, mortar tight and sufficiently rigid to prevent objectionable deformation under load. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the complete surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall be constructed such that keyways, waterstops, and dowels can be placed as shown in the plans.

The form surfaces shall be smooth, free from irregularities, depressions, sags, or holes when used for permanently exposed faces. Bolts and rods used for internal ties shall be so arranged that, when all forms are removed, all metal will not be less than one from any concrete surface. Wire ties will not be permitted. All forms shall be so constructed so that they can be removed without hammering or prying against the concrete. All exposed joints shall be chamfered and suitable molding shall be placed to bevel or round exposed edges or corners, unless otherwise directed by the Engineer.

Temporary openings shall be provided in the inside form of all wall forms and column forms to facilitate cleaning and inspection immediately before depositing concrete. When wood sheeting is used for the inside form, the bottom board shall be fitted and removed to provide a continuous clean out space and if plywood is used, the forms shall be started with a 6 inch wide piece for the same purpose. Washing out of

all forms and other concrete before pouring new materials must be done with water or air from hose under pressure. The hose must be provided with a suitable nozzle for this work. The intent of these specifications is to produce a perfectly watertight structure in all cases, without any subsequent repair work. Forms shall be so assembled that their removal will not damage the concrete.

Contact surfaces of forms shall be divided into two categories: forms for exposed concrete and forms for unexposed concrete. Exposed concrete shall mean concrete normally exposed to view and shall be considered extending 6 inches below planned regrade or water level. Exposed concrete shall exclude interior surfaces of covered water holding basins and unpainted, unfinished, interior surfaces of manholes and vaults. Unexposed concrete shall be concrete not normally exposed to view and shall include all concrete not included by exposed concrete, unless otherwise noted on the plan or in the specifications. Either unlined forms or lined forms (as hereinafter specified) shall be used for exposed concrete. A combination of lined forms for exposed concrete and unlined forms for unexposed concrete may be used in a structure where only a part of the structure is exposed. When this combination occurs, the Engineer will determine, upon request of the Contractor, if that portion of the structure which requires lined forms can be reduced in section to accommodate the liner without offsetting the liner backing from the sheathing used for the unexposed portion of the structure.

3.2 Construction Tolerance

The forms shall be constructed and rigidly braced in place within the following tolerances:

(1) Variation from true alignment as shown on the drawings in the lines and surfaces of walls:

In 10 feet	1/4 inch
In 20 feet maximum	3/8 inch
In 40 feet or more	3/4 inch

(2) Variation from the level or from the grades indicated on the drawings in floors or slabs:

In 10 feet	1/4 inch
In 20 feet maximum	3/8 inch
In 40 feet or more	3/4 inch

(3) Variation in sizes and/or locations of floor and/or wall openings: 1/3 inch

(4) Variation in thickness of slabs and walls and in cross-sectional dimensions of columns and beams:

Minus	1/4 inch
Plus	1/2 inch

(5) Variation in plan dimension of footings:

Minus	1/2 inch
Plus	2 inches

3.3 Wetting and Oiling Forms

The inside surface of wood board forms shall be soaked with clean water and kept continuously wet for 12 hours before any concrete is placed. In case forms have been erected for some time and have become dry so that joints have opened, then the forms shall be thoroughly soaked at least twice each day for at least 3 days prior to placing concrete. If the forms cannot be tightened to the satisfaction of the Engineer, they shall be torn down and rebuilt. Plywood forms may be treated with a nonstaining form oil, mineral oil or lacquer. If oil is used, all excess oil shall be wiped off with rags to leave the surface of the forms just oily to the touch. In freezing weather, oil shall be used.

3.4 Form Removal

Forms shall not be removed without approval of the Engineer. All form removal shall be accomplished in such a manner as to prevent injury to the concrete.

Forms shall not be removed sooner than the following minimum times after the concrete is placed. These periods represent cumulative number of days and fractions of days, not necessarily consecutive, during which the temperature of the air adjacent to the concrete is above 50^{o}F.:

Element	Time
Beams, arches - supporting forms and shoring	14 days
Conduits, deck slabs - supporting (inside) forms and shoring	7 days
Conduits (outside forms), sides of beams, small structures	24 hours
Columns, walls, spillway risers - with side or vertical load	7 days
Columns, walls, spillway risers - with no side or vertical load	4 days
Concreting supporting more than 30 feet of wall in place above it.	7 days
Concrete supporting 20 to 30 feet of wall in place above it.	4 days

Age of stripped concrete shall be at least 7 days before any load other than the weight of the column or wall itself is applied.

When conditions on the job are such as to justify the requirements, forms will be required to remain in place for longer periods. Forms for beams, girders, and floor slab shall remain in place for at least seven days and shall only be removed when test cylinders used under the same condition as the members break with a compressive strength as required in these specifications.

End of Section

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1. GENERAL

1.1 Work Included

The work covered by this specification consists of furnishing, cutting, bending and placing all steel reinforcement, including rods and fabric, as indicated on the drawings or otherwise required and in accordance with these specifications.

1.2 Submittals

Submit manufacturer's specifications for materials and installation instructions. Include test reports showing compliance with project requirements where test method is indicated.

1.3 Delivery and Storage

Notify the Engineer when materials will be received on the job so that proper arrangements may be made for inspecting the unloading operations and examining the materials.

PART 2. PRODUCTS

2.1 Bars

All bar reinforcement for reinforced concrete construction shall be new billet steel of intermediate, or hard grade or rail steel reinforcement bars and conforming to ASTM A-615 and A-616. All bars shall be rolled so as to comply with the requirements of ASTM A-305.

2.2 Welded Wire Fabric

Welded wire fabric shall comply with the requirements of ASTM A-185.

2.3 Cold-Drawn Steel Wire

Cold-drawn steel wire shall comply with the requirements of ASTM A-82.

2.4 Black Annealed Wire

Black annealed wire shall be cold-drawn wire and shall have a tensile strength of not less than 40,000 pounds per square inch.

PART 3. EXECUTION

3.1 Bending

Reinforcing bars may be mill or field bent. All bends shall be made in compliance with the requirements of the American Concrete Institute Standard 315 and by approved machine methods except as noted otherwise on the drawings. All bends shall be made without heating. Bars with kinks, cracks or improper bends will be rejected.

3.2 Installation

All reinforcement shall be free from dirt, oil, grease, paint, mill scale, loose or thick rust, or other coating which might destroy or reduce its bonds with the concrete when the surrounding concrete is placed.

All reinforcement shall be placed in accordance with the drawings as furnished or approved by the Engineer and shall be held so securely in position by wiring and blocking from the forms and by wiring together at intersections that it will not be displaced during the placement of the concrete. Tack welding of bars will not be permitted.

The minimum cover for all main reinforcement shall conform to the dimensions shown on the drawings which will indicate the clear distance from the edge of the reinforcement to the concrete surface.

The following tolerances will be allowed in the placement of reinforcing bars as shown on the drawings:

(1) Variation in protective cover

1/4 inch for 2-inch cover
1/2 inch for 3-inch cover

(2) Variation of spacing

1/12 of indicated spacing

Any supplemental bar schedules, bar lists or bar-bending diagrams required to accomplish the fabrication and placement of reinforcement shall be provided by the Contractor. Prior to placement of reinforcement, the Contractor shall furnish three prints or copies of any such lists or diagrams to the Engineer. Acceptance of the reinforcement will not be based on approval of these lists or diagrams but will be based on inspection of the reinforcement after it has been placed.

All reinforcement for any pour shall be secured in place by use of metal or concrete supports, spacers, or ties, as approved by the Engineer, before the pour is started. The supports shall be used in such a manner that they will not be exposed or contribute in any way to the discoloration or deterioration of the concrete.

Steel in slabs poured on earth or compacted dense graded aggregate shall be supported by concrete masonry units on subgrade, and/or by approved metal supports with sand plates. Steel in slabs poured on solid rock shall be supported as for slabs on earth except that sand plates are not required.

All splices in reinforcement shall be as shown on the drawings or as directed by the Engineer. Unless otherwise specified on the drawings, splices shall overlap at least 30 times the diameter of the smaller bar in the splice, but not less than 12 inches. Splices shall overlap 40 diameters for hoop steel in circular walls. The lapped ends of bars shall be connected by lapping and tying as a single continuous bar to develop the strength of the bar.

Welded wire fabric shall be spliced using wire tires or standard clips in the following manner.

(1) Adjacent sections shall be spliced end to end by either:

(a) Overlapping the two pieces of fabric one full mesh (measured from the ends of the longitudinal wires in one piece to the ends of the longitudinal wires in the other piece) and securing the two pieces together with wire ties placed at intervals of 18 inches; or,

(b) Overlapping the two pieces of fabric so that the end crosswire of each piece comes in contact with the next-to-end crosswire of the other piece and securing the two pieces together only as required to keep the fabric in place and to prevent it from curing.

(2) Adjacent sections of fabric shall be spliced side to side by either:

(a) Placing the two selvage wires (the longitudinal wires at the edge of the fabric) one along side and overlapping the other and securing the two pieces together with wire ties placed at intervals of 3 feet; or

(b) Placing each selvage wire in the middle of the first mesh of the other section of fabric and securing it to the other section at intervals of 10 feet by means of wire ties placed on the selvage wires alternately at intervals of 5 feet.

3.3 Inspection

The Contractor shall secure from the manufacturer, and furnish in duplicate, certified copies of the mill test report for each delivery of bar reinforcing steel to the job. The bars shall be properly tagged so as to permit identification of the heat number shown on the mill test report for any and all steel delivered to the work.

3.4 Storage

Steel reinforcement shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected, as far as practicable, from mechanical injury and surface deterioration caused by conditions producing rust.

3.5 Testing

When tests are required, reinforcement will be tested in accordance with the above ASTM Specifications for each class, except that tensile tests shall comply with the requirements of ASTM E-8.

End of Section

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1. GENERAL

1.1 Work Included

This specification covers the furnishing of all materials, equipment, and labor, and performing all operations specified herein, including the manufacturing, transporting, placing, finishing and curing of the concrete. The furnishing and placing of reinforced steel is covered in a separate technical specification.

1.2 Submittals

The Contractor shall be responsible for the design of the concrete mixtures and the quality of the concrete including ready-mix. Prior to any concrete placement, the Contractor shall furnish a statement to the Engineer giving the proportions by dry weight of cement and of fine and coarse aggregate that will be used in the manufacture of each class of concrete contained in the contract.

1.3 Delivery

Notify the Engineer 48 hours before concrete will be received on the job so that proper arrangements may be made for inspecting the materials and installation.

PART 2. PRODUCTS

2.1 Concrete

Concrete shall be composed of Portland cement, water, fine aggregate, coarse aggregate and required admixtures. The design of the concrete mixture will be based on the water-cement ratio necessary to secure a plastic workable mixture suitable for the specific conditions of placement and, when properly cured, a product having durability, impermeability and strength. The concrete mixture shall be designed so that the concrete placed according to plans shall produce a minimum laboratory cylinder compressive strength equal to the required strength.

Concrete shall be classified as Class A, Class B, Class C and Class D or E. The basis of classification of concrete shall be the minimum compressive strength at twenty-eight days as listed below. Other minimum design requirements are also shown.

Class	Minimum Strength (psi) (7-day)	(28-day)	Cement/Factor (Bags/C.Y.)	Slump Range (Inches)
A	2850	4000	6.0	1 1/2 to 3
B	2200	3000	5.2	2 to 4
C	1800	2500	4.8	2 to 4
D	1500	2000	4.5	3 to 6
E	-	-	3.5	3 to 6

Unless otherwise specified, the air content (by volume) of the concrete at the time of placement shall be:

Maximum Size Aggregate	Air Content (%)
3/8 inch to 1/2 inch	6 to 9
Over 1/2 inch to 1 inch	5 to 8
Over 1 inch to 2 1/2 inches	3 to 6

2.2 Cement

Portland cement shall meet the requirements of ASTM C-150 for the type of cement specified. Air entraining Portland cement shall meet the requirements of ASTM C-175 for the type of cement specified.

2.3 Aggregates

Aggregates shall conform to the provisions of ASTM C-136 and ASTM C-33. Sand shall consist of clean, well graded particles of hard, durable stone and shall contain limited amount of deleterious substances. It shall be equivalent to washed Ohio, Scioto, or Cumberland River sand.

Coarse aggregate shall be washed river gravel or crushed limestone of hard durable particles and shall contain limited amounts of deleterious substances. The maximum size of coarse aggregate will be limited to one and one-half inches.

2.4 Water

Water used in mixing concrete shall be fresh, clean and free from sewage, oil, acid, alkali, salts, or organic matter. The water used in mixing must be a minimum required for a plastic mix. No water will be permitted for purposes of hastening mixing and reducing tamping or vibration.

2.5 Admixtures

A. Air-Entrainment. The air-entraining admixtures shall fully meet the requirements of ASTM C-260 and shall be subject to tests in accordance with ASTM C-233.

B. Retarding Agents. Approved types of retarding agents shall be included in the concrete mix when specified or authorized in writing by the Engineer.

C. Other Compounds. The use of calcium chloride or other accelerators or anti-freeze compounds will not be allowed.

2.6 Waterstops

Copper used for waterstops shall conform to ASTM B-248.

Steel used for waterstops shall conform to ASTM A-366 or ASTM A-93.

Wrought iron used for waterstops shall conform to ASTM A-162 or ASTM A-163.

Plastic material used for waterstops shall conform to ASTM D-742

The rubber waterstop material shall meet the following physical requirements when and if tested, in accordance with the appropriate sections of Federal Test Method Standard No. 601, ASTM D-395, and ASTM D-1432.

Hardness - The Shore A durometer hardness shall be 60 to 70.

Elongation - The elongation shall be a minimum of 400 percent.

Tensile Strength - The tensile strength shall be a minimum of 2,500 pounds per square inch.

Water Absorption - The water absorption shall be a maximum of 5 percent by weight after immersion in water for two days at 158^{o}F.

Tensile Strength After Aging - The tensile strength after accelerated aging for five days at 158°F, shall not be less than 80 percent of the original tensile strength.

Compression Set - The compression set after 22 hours at 158°F., shall not be more than 30 percent.

Specific Gravity - The specific gravity shall be 1.20 plus or minus .05.

PART 3. EXECUTION

3.1 Batching and Mixing

A. Equipment. Mixing equipment shall be capable of combining the aggregate, cement and water into a uniform mixture and of discharging this mixture without segregation. Adequate facilities shall be provided for the accurate measurement of the materials entering the concrete.

Truck mixers shall be equipped with an accurate device for measuring the amount of water added. Truck mixers and agitator shall be operated within the limits of capacity and speed of rotation designated by the manufacturer of the equipment.

B. Mixing Time. Neither the speed nor the volume capacity of the mixer shall exceed those recommended by the manufacturer. Excessive overmixing, requiring additions of water to preserve the required consistency, will not be permitted. The mixing time for each batch after all solid materials are in the mixer drum, provided that all the mixing water shall be introduced before one-fourth of the mixing time has elapsed, shall be not less than two minutes for mixers having capacities up to two cubic yards. For mixers of larger capacities, this minimum shall be increased fifteen seconds for each cubic yard of fraction thereof of additional capacity.

When a truck mixer is used, each batch of concrete shall be mixed not less than fifty nor more than three hundred revolutions, at a mixing speed of not less than four rpm. after all materials are in the mixer drum. In all such cases, however, the concrete shall be delivered to the job site and discharged within 1-1/4 hours or before the drum has revolved 300 times, whichever comes first, after the mixing water has been added.

C. Consistency. The consistency of any concrete shall be such that it can be worked readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface. The following ranges represent the extreme limits of allowable slump when tested, in accordance with ASTM C-143. Where vibrators are used, the Engineer may allow a slightly less slump than the specified minimum.

The quantity of mixing water shall not be changed without the consent of the Engineer.

D. Air-Entrained Concrete. When air-entrained concrete is specified, air-entrainment shall be accomplished by using an air-entrained Portland cement or by using an air-entraining admixture with normal Portland cement. Air-entraining admixtures shall be added in solutions to a portion of the mixing water by means of a mechanical batcher in a manner that will insure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be determined as a percentage of the volume of the concrete by following the methods specified in ASTM C-138, C-173, or C-231. Air content determination shall be made on samples of concrete during placement of the concrete in the forms.

When air-entrained concrete is specified, the amount of water and fine aggregate prescribed for normal concrete shall be reduced to compensate for the increased volume of air contained in the air-entrained concrete.

3.2 Testing

A. Slump Test. At least one slump test shall be made before first concrete pour, at the start of pouring any concrete and at each seven cubic yards deposited during one operation. These shall be made from same samples as those taken for cylinder tests and records of same kept therewith. Tests shall be made according to ASTM C-143 and as required under ASTM C-94 for ready-mixed concrete. The Contractor shall furnish the necessary equipment and labor for making slump tests.

B. Entrained Air Tests. The Contractor shall furnish and have on the job at all times, one LA-345 Chase Air Indicator Kit, one LA-340 Spare Chase Air Indicator and two quarts of isopropyl alcohol (rubbing alcohol) for the Engineer's use in making entrained air measurements.

The amount of measured entrained air shall be recorded by the Engineer. Mortar shall be sampled only from concrete taken directly from the mixer. At least one air measurement shall be made for each test cylinder taken.

C. Periodic Cylinder Tests. All cylinders shall be made per ASTM C-31 and tested per ASTM C-39. The Contractor shall furnish all labor and equipment for sampling and curing cylinders on the job site and transportation to the laboratory for testing.

At the start of concreting, three cylinders shall be made. One shall be tested at 7 days and two shall be tested at 28 days.

Throughout the remainder of the job, the Engineer shall direct when cylinders shall be taken and in what number they shall be taken. At each time when twenty or more cubic yards of concrete are placed during one operation and when the sum of smaller deposits of concrete equal thirty cubic yards since previous test and at any change in mix, three cylinders shall be made. One shall be tested at 7 days and two shall be tested at 28 days.

For a strength test, three test specimens will be made from a composite sample. The test result will be the average of the strength of the thee specimens, except that, if one specimen in a test shows manifest evidence of improper sampling, molding, or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen, representing a given test, show definite defects due to improper sampling, molding, or testing, the entire test shall be discarded.

The Engineer will ascertain and record the batch number for the concrete and the exact location in the work at which each batch represented by a strength test is deposited.

The Engineer shall have free entry to the plant and equipment furnishing concrete under the contract. Proper facilities shall be provided for the Engineer to inspect materials, equipment and process and to obtain samples of the concrete. All tests and inspections will be conducted so as not to interfere unnecessarily with the manufacture and delivery of the concrete.

If cylinders do not meet strength requirements, the Engineer can order shutdown on all concreting and redesign of concrete mix. The cost of mix redesign shall be paid for by the Contractor. The Engineer can also order additional tests, such as load tests, Swiss Hammer tests and/or core tests in the areas of the work represented by unacceptable cylinders. If areas of work are found to be under strength requirements, the Engineer can order the Contractor to strengthen or replace those areas at the expense of the Contractor.

When it is determined that such concrete shall be removed and replaced the Contractor shall be notified in writing, stating the extent of the replacement to be made.

3.3 Conveying

Concrete shall be conveyed from mixer to forms as rapidly as practicable, by methods which will prevent segregation or loss of ingredients. There shall be no vertical drop greater than five feet, except where suitable equipment is provided to prevent segregation.

Belt conveyers, chutes or other similar equipment in which the concrete is delivered to the structure in a thin, continuously exposed flow, will not be permitted, except for very limited or isolated sections of the work. Such equipment shall be arranged to prevent segregation.

Where wall forms exceed five feet in height, suitable measures, such as the use of tremie tubes, where practicable, or portholes, shall be provided in the forms to limit the vertical drop of the concrete to a maximum of five feet. Openings shall be spaced around the perimeter of five feet. Openings shall be spaced around the perimeter of the formed area so that lateral flow of fresh concrete will be limited to three feet. Drop chutes which may be provided to convey the concrete through wall ports shall have an outside pocket under each form opening to stop the concrete and allow it to flow easily over into the form without separation.

3.4 Placing

A. General. No concrete shall be placed until the forms and subgrade are free of chips, dirt, sawdust, or other extraneous materials and the Engineer has given his approval of the subgrade, forms and reinforcing steel in place. No concrete shall be placed except in the presence of the Engineer and the Contractor shall give reasonable notice of his intention to place concrete.

Concrete shall be placed within one and one-quarter hours after the introduction of the water to the cement and aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or where the temperature of the concrete is 85^{o}F or above, the time shall be reduced to 45 minutes. Concrete shall be deposited as closely as possible to its final position in the forms so that flow within the mass and consequent segregation are reduced to minimum. Vibrators may be used to aid in the placement of the concrete provided they are used under experience supervision and the forms designed to withstand their action. The duration of vibration shall be limited to that necessary to produce satisfactory consolidation without causing segregation. Vibration shall not be applied directly to the reinforcement steel or the forms nor to concrete which has hardened to the degree that it does not become plastic when vibrated.

When a vibrator is used, the Contractor shall also spade the concrete along form surfaces a sufficient amount to prevent excessive size or numbers of air-void pockets in the concrete surface, except where an approved absorptive form lining is used; in which case the spading specified above will not be permitted.

B. Lifts in Concrete. The permissible depth of concrete placed in each lift shall be as shown on the drawings or specified herein. All concrete shall be deposited in horizontal layers not exceeding twenty inches in thickness, unless otherwise authorized. The placement shall be carried on at such a rate that the formation of cold joints will be prevented. If a delay occurs in excess of a thirty minute interval between any two consecutive batches or loads, or in case of any delay between placing batches that allows previously placed concrete to take initial set, the Contractor shall discontinue the placing of concrete and make a construction joint before proceeding with the placing operations. He shall remove any portion of the previously placed concrete that is deemed necessary for the proper formation of the construction joint and no payment shall be made to the Contractor for the concrete removed. The thirty minute limitation, cited immediately above, may be extended in those cases where an approved type retarder is added to the concrete mixture to delay the set of the concrete.

Hoppers, chutes and pipes shall be used as necessary to prevent splashing of mortar on forms and reinforcing above the layer being placed.

C. Placing Temperature. When the atmospheric temperature may be expected to drop below 40°F at the time concrete is delivered to the work site, during placement or any time during the curing period, the following provisions also apply:

(1) The temperature of the concrete at the time of placing shall not be less than 50°F nor more than 90°F. The temperature of neither aggregates nor mixing water shall be more than 100°F just prior to mixing with the cement.

(2) When the daily minimum temperature is less than 40°F, concrete structures shall be insulated or housed and heated after placement. The temperature of the concrete and air adjacent to the concrete shall be maintained at not less than 50°F nor more than 90°F for the duration of the curing period.

(3) Methods of insulating, housing and heating the structure shall conform to "Recommended Practice for Cold Weather Concreting", ACI Standard 306.

(4) When dry heat is used to protect concrete, means of maintaining an ambient humidity of at least 40 percent shall be provided unless the concrete has been coated with curing compound or is covered tightly with an approved impervious material.

For obtaining the proper curing conditions for the concrete poured, steam heating equipment, oil-fired blowers (airplane heaters) located outside the enclosure and blowing hot air into the enclosure, or other similar equipment of a capacity sufficient to maintain the required minimum temperature all over, will be required. In conjunction with forced air heaters, means of supplying moisture to the area being cured will also be required. Oil or coke burning salamanders and other fuel-burning heaters produce carbon dioxide which combines with calcium hydroxide in fresh concrete to form a weak layer of calcium carbonate. When this occurs, the surface of the concrete floor will dust under traffic. For this reason, carbon dioxide producing heaters shall not be used while placing concrete and for the first 24 to 36 hours of the curing period unless they are properly vented.

The Contractor must have a sufficient steam retaining canvas or other protective covering at the site to cover all sides and tops of forms to be poured and concrete to be cured, before pouring of concrete will be allowed. This covering must be placed over and around forms and concrete being cured in such a manner that circulation of curing air will prove effective to the tops of floors and to the outside, top and corners of concrete structures, as well as to their interiors. The Contractor may strip forms during curing period with covering removed, provided atmospheric temperatures are above specified curing temperatures, concrete surfaces are kept moist, and time and labor are available for recovering for lower night temperatures.

When climatic or other conditions are such that the temperature of the concrete may reasonably be expected to exceed 85°F at the time of delivery at the work site, during placement, or during the first 24 hours after placement, the following provisions also shall apply:

(1) The Contractor shall maintain the temperature of the concrete below 85°F during mixing, conveying, and placing. Methods used shall conform to "Recommended Practice for Hot Weather Concreting," ACI Standard 605.

(2) The concrete shall be placed in the work immediately after mixing. Truck mixing shall be delayed until only time enough remains to accomplish it before the concrete is placed.

(3) Exposed concrete surfaces which tend to dry or set too rapidly shall be continuously moistened by means of fog sprays or otherwise protected from drying during the time between placement and finishing, and after finishing.

(4) Finishing of slabs and other exposed surfaces shall be started as soon as the condition of the concrete allows and shall be completed without delay.

(5) Concrete surfaces exposed to the air shall be covered as soon as the concrete has hardened sufficiently and shall be kept continuously wet for at least the first 24 hours of the curing period and for the entire curing period unless curing compound is applied.

(6) Formed surfaces shall be kept completely and continuously wet for the duration of curing period (prior to, during and after form removal) or until curing compound is applied.

(7) If moist curing is discontinued before the end of the curing period, white pigmented curing compound shall be applied immediately.

D. Concrete on Rock Foundations. Rock surfaces upon which concrete is to be placed shall be clean, standing water, mud, debris, and loose or unsound fragments. All rock surfaces shall be kept continuously wet for forty-eight hours and all horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar of the same sand-cement ratio as used in the concrete.

E. Concrete on Earth Foundations. Unless otherwise authorized all concrete shall be placed upon clean, damp surfaces free from frost, ice, or deleterious materials and standing or running water. Concrete shall not be placed in mud, dried porous earth or upon fill that has not been subject to approved rolling or tamping until optimum compaction has been obtained.

F. Vertical Joint Spacing. The layout of all monoliths shall be as shown on the drawings or as directed by the Engineer before construction is started.

G. Placing Concrete through Reinforcement. In dropping concrete through reinforcement, care shall be taken that no segregation of the coarse aggregate occurs.

3.5 Construction Joints

Construction joints shall be located as indicated on the contract drawings, or as approved by the Engineer. The surfaces of construction joints shall be clean when covered with fresh concrete. Cleaning shall consist of the removal of all laitance, loose or defective concrete and foreign material. Cleaning of the surface of construction joints shall be accomplished by the use of high velocity air-water jets, wet sandblasting, or other effective means. Surfaces of construction joints that have been permitted to dry by reason of the succeeding lift or adjoining concrete not being placed within the specified post-curing period shall be moistened and kept continuously moist for at least forty-eight hours immediately prior to the placing of the succeeding lift of adjoining concrete. All pools of water shall be removed from the surfaces of construction joints before the new concrete is placed.

3.6 Finishing

A. Repair of Defects. Honeycombed areas and voids left by the removal of tie rods, ridges on all concrete surfaces permanently exposed to view or exposed to water on the finished structure, shall be repaired immediately after the removal of forms. Voids left by removal of tie rods shall be reamed and completely filled with dry-patching mortar.

Defective concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails, or anchors. Defective areas shall be chipped away to a depth of not less than 1 inch with the edges perpendicular to the surface. The area to be patched and a space at least 6 inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar. A grout of equal parts Portland cement and sand with sufficient water to produce a brushing consistency, shall then be well rushed into the surface, followed immediately by the patching mortar. The patch shall be made of the same material and of approximately the same proportions as used for the concrete except that the coarse aggregate shall be omitted. The mortar shall not be richer than 1 part cement to 3 parts sand. On exposed surfaces, white Portland cement shall be substituted for a part of the gray Portland cement to match the color of the surrounding concrete. The proportion of white and gray cements shall be determined by making a trial patch.

The amount of mixing water shall be as little as consistent with the requirements of handling and placing. The mortar shall be retempered without the addition of water by allowing it to stand for a period of 1 hour during which time it shall be mixed occasionally with a trowel to prevent setting.

The mortar shall be thoroughly compacted into place and screeded off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of 1 to 2 hours to permit initial shrinkage before being finally finished. The patch shall be finished in such a manner as to match the adjoining surface.

Excessive rubbing of formed surfaces will not be permitted. All uniformed surfaces of concrete, exposed in the completed work, shall have a wood float finish without additional mortar.

B. Removal of Forms. In order that the rubbing required by these specifications shall be effective, nonsupporting forms may be stripped with 24 hours after concrete pouring is completed and initial rubbing required completed within 48 hours. If possible, patching and rubbing shall be done at the same time. This requirement regarding form removal is secondary to heating requirements and the specifications heretofore included regarding heating of concrete shall take precedence.

After the required curing time has elapsed, support forms may be removed to allow finishing. Finish shall be Type I, II, or III as required by the "Concrete Finishes" section. In general, surfaces that will show in the finished work will be rubbed down with a coarse carborundum stone. Floors and slabs shall be float finished as soon as possible after pouring unless otherwise specified. Cement or mortar coating will not be permitted. The Contractor should refer to the section on "Concrete Finishes" for complete finish requirements for all concrete units.

Rubbing is not required lower than 6 inches below water levels in basins, but all fins must be removed and holes patched. Exposed inside surfaces to be painted must be rubbed smooth.

The surfaces of exposed concrete roofs, walks and copings shall be finished with a wooden float and left with a gritty surface similar to that in general use for sidewalks. This finish and floating must be done at the proper period in the setting of the concrete. These outside exposed surfaces of floors and roofs must be finished as one piece of work without a separate top coat.

Basin and channel floors shall be struck off smooth and finished with a steel float to produce a surface easily cleaned. The inside exposed floors must be finished with a steel float to even surfaces and present a neat, smooth and satisfactory appearance. Finish with bevel around all curbings and other openings. Floors must be finished drain to floor traps and sump with slopes as shown on the plans. Floors at the walls must be level except where shown otherwise on the plans.

Surfaces of precast concrete members that are to be painted shall have all air holes and other imperfections filled and dressed to present surfaces comparable in smoothness and appearance to rubbed concrete as set forth above.

C. Watertightness. All concrete when finished must be watertight. Exposed concrete surfaces shall shown no dampness when the interior of basins or exterior of pits have been filled with water for seven days. to obtain this result, the forgoing specifications must be rigidly followed. In case any leakage or dampness shows on the surface of any such walls after testing the time stated, then such defects must be remedied by the Contractor and work will not be accepted until this is done.

D. Openings for Pipes and Joints to Pipes. Pipes shall not be fixed in concrete wall or interior floor pours. Holes of a diameter 1 inch greater than the outside pipe diameter shall be formed accurately to pipe layout dimensions or shall be cored (10 inch diameter and under) in existing concrete slabs or walls.

When piping is placed, the annular ring around it shall be caulked from both sides with dry braided hemp (or unbraided where pipes do not center on grout closure is not necessary), to within 1 inch of wall surface

or 2 inches if grout closure is necessary. Where exposed to view, inside basins, or where watertightness, airtightness, support or prevention of vibration is necessary, the remaining annular ring at the surface shall be troweled full with a nonshrink grout. Then the joint shall be raked back 1/2 inch from the surface and filled with a one to two mix grout of Portland Cement and sand. such joints shall be water and seepage tight.

Where malleable pipe (steel, wrought iron, or copper), a brittle pipe (hard rubber), rubber hose, or any pipe cut to fit on the job, passes through any concrete slab, floor or wall, a wrought or cast iron pipe nipple with about 1/2 inch greater diameter than the outside of the pipe shall be used as a sleeve and cast into the slab. In case of floors above ceilings, these sleeves shall extend 1/2 inch to 1 inch above floor surface, to prevent scouring water from running into them. If joint about pipe is required for watertightness or pipe support, the annular ring shall be caulked with dry, unbraided oakum to within 2 inches of surface. The ring at surface shall be filled with nonshrink grout, raked back 1/2 inch, and filled with 1/2 inch can of Portland Cement grout as previously mentioned.

Where holes greater than 10 inch diameter have to be cut for pipe in existing concrete slabs or walls, the space about the pipe shall be formed to original surfaces and the pipe wrapped with 1/2 inch braided hemp. Where walls and space give sufficient room for safely using large aggregate, this may be added in a quantity equal to the sand specified. After removal of forms, the yarn shall be removed for a depth of 2 inches from water side and/or exposed surfaces and the space refilled to surface with a nonshrink grout. Then the joint shall be raked back 1/2 inch from the surface and filled with a one to two mix grout of Portland Cement and sand.

E. Floor Finishes. The finish of all floors and slabs shall be as described below, by types. Listed below are descriptions of the various type finishes.

(1) Type "A" Screeded. This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. Unless otherwise stipulated, this type of finish shall be used on slabs over which quarry tile, ceramic tile, terrazzo, bituminous mixtures, grout swept in by mechanism, or similar type wearing surface is subsequently to be applied.

(2) Type "B" Wood Floated. This type of integral finish shall be obtained by working a previously screeded surface with a wood float until the desired texture is reached. Unless otherwise stipulated, this type finish shall be used for exterior paved areas, sidewalks, ramps and steps. Care shall be taken to prevent the formation of laitance and excess water on the finished surface.

(3) Type "C" Steel Troweled. This type of integral floor finish shall be obtained by first screeding and then giving a preliminary wood float finish which shall be true, even and free from depressions.

After this operation, and when the concrete has hardened sufficiently to prevent excess fine materials from working to the surface, the surface shall be compacted and smoothed with not less than two through and complete steel troweling operations. The finish shall be brought to a smooth, dense surface, free from defects and blemishes. In areas that are to be covered with resilient flooring, one complete steel troweling operation will be sufficient.

(4) Type "D" Swept-in Grout Topping. This finish shall be applied to certain tank floors as specified. Grout topping shall be placed and spread on a previously screeded and hardened concrete slab. Before placing the grout, the surface shall be properly cleaned, washed and coated with a mixture of water and Portland Cement. The grout shall then be plowed and swept into neat conformance with the blades or farms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention is to be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the CONTRACTOR shall notify the ENGINEER and the equipment manufacturer of the details of the operation, and obtain approval and recommendations, respectively, before commencing work.

(5) Type "E" Hardened Finish. Floor surfaces requiring a hardened finish shall receive a concrete hardener of a type scheduled on the final pages of this section. Concrete hardeners shall be either a liquid applied to the floor surface or a metallic compound which is troweled into the floor surface and made integral with the floor. All concrete hardeners shall be applied in strict conformance with the manufacturer's directions and instructions.

(6) Type "F" Color Finish. Coloring agents shall be a product of an experienced manufacturer and shall be applied in complete accordance with the manufacturer's instructions. Colors and make will be specified on the final pages of this section, if their use is required.

F. Non-floor Finishes. Type I - All holes left by removal of ends of ties, and all other holes, depressions or voids shall be filled solid with mortar after first being thoroughly wetted. Holes shall be filled with a small tool that will permit pack the hole solidly with mortar. Mortar shall consist of one part cement to three parts sand, and the amount of mixing water shall be as little as consistent with the requirement of handling and placing. Color of mortar shall match the adjacent wall surface.

Type II - After completing the Type I finish specified above, the Contractor shall also remove all fins, burrs and other projections left by the removed forms.

Type III - This finish shall be applied after the completion of the Type II finish. A smooth, uniform surface shall be obtained using the "carborundum-rub" finish which shall consist of the following procedure: Surfaces shall be rubbed with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities require it, the general surface of the concrete shall not be cut into. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and re-dressed as directed by the Engineer. Brush finishing or painting with grout or neat cement will not be permitted. Corners and edges shall be slightly rounded by the use of the carborundum stone. No rubbing shall be done before the concrete is seven days old or until the concrete is thoroughly hardened and the mortar used for patching is firmly set.

3.7 Curing and Protection

A. General. All concrete shall be cured for a period of not less than seven consecutive days by an approved method, or combination of methods. The curing process shall be done so as to prevent loss of moisture from the concrete for the duration of the entire curing period. Unhardened concrete shall be protected from heavy rains and flowing water. All concrete shall be adequately protected from damage.

B. Moist Curing. Concrete shall be moist cured by maintaining all surfaces continuously (not periodically) wet for the duration of the entire curing period. Water for curing shall be clean and free from any elements which will cause staining or discoloration of the concrete. Where forms of wood are used and left in place during curing, the wood shall be kept wet at all time.

C. Membrane Curing. At the option of the Contractor and when approved by the Engineer, the concrete may be cured with an approved curing compound of the surface membrane type in lieu of moist curing with water provided a permanent stain is not produced and provided the concrete surface is not to receive rubbed finish, terrazzo, tile, paint, chemical hardening, grout, cement patch, or concrete topping. The curing compound shall be applied to formed surfaces immediately after the forms have been removed and the surfaces cleaned of any loose sand, mortar and debris. The surface to receive the compound shall be moistened thoroughly with water and the compound applied as soon as the moisture film has disappeared but when the surface is still damp. On unformed surfaces, the compound shall be applied immediately after the surface loses its free water and has a dull appearance.

The curing compound shall be applied in a two coat continuous operation by approved spraying equipment and at a coverage of not more than two hundred square feet per gallon for both coats. The second coat shall be applied to overlap the first coat in a direction at approximately right angels to the direction of the first application. Concrete surfaces which are subjected to heavy rainfall within three hours after the curing compound has been applied shall be resprayed by the method and at the coverage herein

specified. All concrete surfaces on which curing compound has been applied shall be adequately protected for the duration of the entire curing period from any damage that would disrupt the continuity of the curing membrane.

The curing compound shall conform to Type 2 or Type 3 of ASTM C-309.

All curing compound shall be delivered to the site of the work in the original sealed container bearing the name of the manufacturer, the brand name and the manufacturer's batch number. The compound shall be approved prior to use. The compound shall be stored so as to prevent damage to the containers and water-emulsion types shall be protected from freezing.

D. Cold Weather. The air and forms in contact with the concrete shall be maintained at temperatures above forty degrees for at least seven days and at a temperature above freezing for at least 21 days. Concrete, permitted to be cured with curing compounds, shall be provided the same protection against freezing and low temperatures as provided herein. No fire or excessive heat shall be permitted near or in direct contact with concrete at any time.

3.8 Expansion and Contraction Joints

A. General. Joints shall be provided at the location indicated on the drawings and according to the details shown, or as otherwise approved. The methods and materials used shall be subject to approval and the materials shall conform to the specification applicable. In no case shall any fixed metal, embedded in concrete be continuous through an expansion or contraction joint, except as specifically detailed in the drawings.

B. Expansion Joint Filler. At all expansion joints shown on the drawings, a premolded joint filler of the thickness specified, shall be provided to prevent bond between and allow for the expansion and contraction of adjacent parts. The filler material shall be of sufficient length and width, and shall be accurately cut, matched and placed to prevent contact of the concrete in the parts of the structure to be separated.

Preformed expansion joint filler shall conform to the requirements of ASTM D-1752, Type I, Type II or Type III, unless bituminous type is specified. Bituminous type preformed expansion joint filler shall conform to the requirements of ASTM D-994.

C. Asphalt-Treated Roofing Felt. Two layers of heavy, smooth surface asphalt-treated roofing felt, approximate weight 55 pounds per 100 square feet, shall be place at expansion joints, as shown on the drawings.

D. Waterstops. Waterstops shall be installed in joints as shown on the drawings or as otherwise directed to provide a continuous watertight diaphragm in the joint. All joints in metal waterstops shall be brazed or welded. Joints in rubber and plastic waterstops shall be cemented, fused, or vulcanized as recommended by the manufacturer. Adequate provisions shall be made to support and completely protect the waterstops during progress of the work. The Contractor shall replace or repair, at this own expense, any waterstops punctured, ruptured, or otherwise damaged before final acceptance of the work.

E. Dowel Bar Assembly. When required, dowel bar assembly shall be installed at the expansion joints as shown on the drawings. The dowel bars shall be plain, smooth steel bars of the size specified on the drawings and shall conform to ASTM A-15. An expansion sleeve shall be provided on one end of each dowel bar. The sleeve shall be metal of an approved type, crimped or capped on one end and provided a minimum of three inch length of covering of the dowel bar with a minimum of three-quarters of an inch expansion chamber beyond the end of the dowel bar. The portion of the dowel bar on the expansion sleeve side of the joint shall be coated with a heavy grease to prevent bond between the bar and the concrete. The dowel bar assembly shall be securely held in place by use of metal dowel chairs at each intersection of a dowel bar and spacer bar. The dowel bars shall be installed on proper horizontal and longitudinal alignment to assure a workable expansion device. The premolded joint filler at these

expansion joints shall be held in a true vertical plane by means of a header board. The header board shall remain in place for a minimum of thirty minutes after the concrete has been placed on one side or until the concrete has set sufficiently to prevent sloughing, before the header is removed and the work of placing concrete continued.

3.9 Embedded Items

A. General. Before placing concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings or required by the Engineer. All embedded items shall be clean and free of oil and other foreign matter such as loose coatings of rust, paint and scale. Any air lines, water lines, wall sleeves, or other materials embedded in structures shall conform to the above requirements and, upon completion of their use, shall be backfilled with concrete or grout as directed by the Engineer.

B. Pipe Embedded in Concrete. Where pipe is partially or wholly encased in concrete, care shall be taken that the pipe is firmly and securely held in place so that the alignment and grade of the pipe is not disturbed while the concrete is placed around the pipe.

End of Section

SECTION 08710

PART 1 – GENERAL

1.01 Related Documents

Drawings and general provisions of contract and Division 1 specification sections, apply to work of this section

1.02 SUMMARY

Work under this heading includes furnishing all hardware to respective trades. The hardware supplier shall promptly furnish templates to all manufacturers furnishing materials necessary for completion of this part.
Extent of finish hardware is indicated on drawing and in schedules.
The following specifications are a guide and a description of the quality materials required. No material of quality or weight less than outlined in this specification will be accepted. The contractor will be responsible for supplying the correct quantity of all materials, whether or not specifically mentioned in this specification. Any additional items that may be required shall be furnished and be of type, quality, and utility consistent with other hardware specified.

1.03 SUBMITTALS

ARCHITECT'S HARDWARE SCHEDULE:

Architect's hardware schedule is by hardware set number. Refer to drawings for designation of hardware set number applicable to each opening. Certain additional items of hardware and/or hardware accessories specified herein shall be finished and noted on the hardware schedule.

SUPPLIER'S HARDWARE SCHEDULE

A complete hardware schedule, indicating type, number, location, and finish shall be submitted to architect for approval, together with such samples as may be required for review. Opening numbers shall be same as used in contract documents. Schedule shall be prepared according to Door and Hardware Institute recommendations (schedule and sequence format) and shall include degree of door closer installation.
Supplier's hardware schedule will be reviewed by architect for type, quality, finish, and for function (other than hand). Contractor shall be responsible for checking schedule for correct hand of locksets and for supplying quantity of items required by contract documents.
Provide supplementary or revised hardware schedules if deemed necessary by architect.
Do not ship or deliver hardware to job prior to review of hardware schedules by architect.
Hardware schedule shall be submitted in the following format. Hardware schedules submitted to architect for review not in this format will be rejected:

HARDWARE HEADING 1

1 Sgl Door #001 Exterior from Corridor RHR 90 deg
Each leaf 3'0 x 7'0 x HMF x NLWD

Item, quantity, manufacturer's #, size, product type, finish, and product information

3 ea	Hinge	5BB1 NRP 4.5 x 4.5	630	IV
1 ea	Cylinder	951 x GGMK	26D	FA
1 ea	Exit Device	25R L Dane x 3070 x RHR	32D	FA
Etc.				

1.04 QUALITY ASSURANCE

All hardware shall be furnished by an established Builders Hardware firm who maintains and operates an office, display, and stock in this area, and who is a regular authorized distributor of the lock he proposes to furnish. All hardware schedules submitted for approval shall carry the signature and seal of a certified Architectural Hardware Consultant who is employed by the hardware firm supplying material.

1.05 PROJECT CONDITIONS

Delivery storage and handling: Hardware supplier shall receive and check all hardware at his warehouse. Drop shipments to the jobsite from various manufacturers will not be permitted. All hardware shall be in its original packaging and plainly labeled and numbered to agree with the numbers and as listed in the hardware schedule. The contractor shall submit his schedules for approval to the architect before proceeding with any work. When required, hardware supplier shall deliver hardware and/or hardware templates to the various door manufacturers. The general contractor shall provide storage facilities for the finish hardware after delivery to the job site.

1.06 ITEMS NOT INCLUDED

Hardware for metal windows, toilet partitions, cabinets, access panels, etc. is not included in this section. See other sections for hardware to be furnished by others. Reference Division 16 for electrical requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

Numbers given in this schedule are of the following manufacturers.

PRODUCTS	MFG. SPECIFIED	APPROVED EQUAL
Falcon	Key cylinders and cores	No Substitutions allowed
Hinge	IVES	Hager, Bommer
Locks	Falcon	Schlage Lock
Exits	Falcon	Von Duprin
Closers	LCN	Sargent
Trim/Auxiliary	Hager Companies	Rockwood, Ives
Weather Strip	Hager Companies	NGP, Pemko

2.02 HARDWARE FINISHES

The designations used to indicate hardware finishes are those listed in ANSI /BHMA A156.18, “Materials and Finishes”, including coordination with the traditional U.S. finishes, shown by certain manufacturers for their products.

1.	Butt Hinges	US26D (652) Satin Chrome US32D (630) Satin Stainless Steel
2.	Mortise Cylinders, Rim Cylinders, and “Permanent” Interchangeable Cores	US26D (626) Satin Chrome
3.	Cylindrical Latch sets and Locksets	US26D (626) Satin Chrome
4.	Exit Devices	US26D (626) Satin Chrome
5.	Door Closers	ALUM (689) Powder Coat Aluminum
6.	Wall and Floor Stops	US32D (630) Satin Chrome
7.	Door Pulls	US32D (630) Satin Chrome
8.	Push Plates	US32D (630) Satin Chrome
9.	Mop, Kick, and Armor Plates	US32D (630) Satin Chrome
10.	Saddle Thresholds	Mill Finish Aluminum, Uncoated
11.	Door Sweeps	Satin Aluminum, Clear Anodized
12.	Self Adhesive Seals	Charcoal
13.	Door Silencers	Gray Gray (Rubber)

2.03 HINGES

Characteristics:

a. Tested to be in accordance with ANSI / BHMA A156.1.
b. Templates: Provide only template-produced units.
c. Fasteners: Provide Phillips flat-head screws complying with the following requirements.
    (1) For metal doors and frames, install machine screws into drilled and tapped holes.
    (2) For wood doors and frames, install threaded-to-the-head wood screws.
    (3) For fire-rated wood doors, install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
    (4) Finish screw heads to match surface of hinges or pivots.
d. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
    (1) Out-Swing Exterior Doors: Non-removable pins.
    (2) Out-Swing Interior Doors: Non-rising pins and Non-removable pins; as indicated in the Door Hardware Sets.
    (3) In-Swing Exterior / Interior Doors: Non-rising pins.
    (4) Tips: Flat button and matching plug. Finished to match hinge leaves.
e. Size: Size hinges in accordance with the specified manufacturer's published recommendations.
f. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high.

Furnish one additional hinge for each additional 2-1/2 feet or fraction thereof.

2.04 CYLINDERS and KEYS

Characteristics:

a. Tested to be in accordance with ANSI / BHMA A156.28.
b. "Equip all cylinders and locksets with, a minimum of, 7-pin interchangeable core, tumbler cylinders. FALCON SFIC "A" keyway
c. Provide a NEW Key System for this Project.
d. Furnish cylinders and locksets with temporary, brass / keyed, "Construction" interchangeable cores for the duration of the time of construction. Construction cores, master keys, and control keys shall not be part of the Owner's Permanent Key System or furnished on the same keyway (or key section) as the Owner's Permanent Key System. Construction cores, master keys, and control keys are the property of the manufacturer and shall be returned when the Permanent cores and keys are installed. Remove these "Construction" interchangeable cores ONLY when directed by the Architect and / or Owner.
e. Furnish final "Permanent" interchangeable cores and keys, for installation by the Owner.
f. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

g. Comply with the Owner's instructions for keying requirements and, except as otherwise indicated, provide individual change keys for each lock that is not designated to be keyed alike with a group of related locks. All keys are to be:

(1) Permanently inscribe each key with number of lock that identifies the cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".

h. A key meeting between the Owner and a representative of the successful finish hardware distributor shall be arranged subsequent to the return of the Approved Finish Hardware Schedule. A keying schedule will be established by the finish hardware distributor's representative and submitted to the Owner, for Approval. After the Owner's review, the keying schedule shall be returned to the distributor's representative such that the Permanent cores and keys can be prepared on a timely basis.

i. Permanent cores and keys will be transmitted directly to the Owner by the Finish Hardware Distributor. The Owner shall be responsible for the installation of the Permanent cores and the return of the Construction cores and keys.

j. Key Material: Provide keys of nickel silver only.

k. Key Quantities: Furnish the following quantities of keys for the entire project.

(1) Ten (10) Each - Construction Master Keys
(2) Two (2) Each - Construction Control Keys
(3) Five (5) Each - Permanent Master Keys
(4) Two (2) Each - Permanent Control Keys
(5) Three (3) Each - Permanent Change Keys (For Each Keyed Door Opening)

The "Exterior" and "Interior" Permanent Interchangeable Cores Cylinders shall be operated by the same key system.
Deliver all Construction interchangeable cores and keys to the General Contractor. Deliver all Permanent interchangeable cores and keys to the Owner, via Registered Mail.

2.05 Cylindrical Locksets

Characteristics:

a. Tested to be in accordance with or exceed ANSI / BHMA A156.2 Series 4000, Grade 2 Strength
b. U.L. Listed for 3-hour doors.
c. Levers and roses as specified in sets
d. Manufactured by FALCON Lock Company.

2.06 EXIT DEVICES:

Characteristics:

a. Tested to be in accordance with ANSI A156.3, 1994, Grade 1. All exit devices to be heavy duty, with one-piece removable covers. The housing shall be manufactured from extruded aluminum without exposed screws or rivets.

b. Exit Devices shall be “UL” listed for Life Safety. All exit devices for fire-rated door openings shall have “UL” labels for “Fire Exit Hardware”.
   All exit devices shall conform to NFPA 80 and NFPA 101 requirements.
c. All series exit devices shall be “touchpad” (modern) types, incorporating a hydraulic fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with the exit device operation.
   All exit devices shall be non-handed. The touchpad shall extend a minimum of 1/2 of the door width and shall be a minimum of 2-3/16” in height. Plastic touch pads shall not be acceptable. The touchpad height shall exceed height of mechanism case or rail assembly to eliminate “Pinch Points”. If the touchpad height does not exceed the height of the mechanism case or rail assembly, provide a factory installed insert / filler on the top and bottom of the touchpad along the mechanism case and rail assembly; to prevent “Pinch Points”.
d. All latch bolts to be the deadlocking type. Latch bolts shall have a self-lubricating coating to reduce wear. Plated or plastic coated latch bolts shall not be acceptable.
e. All metal end caps to be standard with all exit devices.
f. Exit device strikes, where surface applied, shall be a roller type and have an anti-slip mounting plate.
g. All outside exit device trim shall be forged brass, full escutcheon. The pull shall have a grip that is 6 ¼’ CTC and project 2 11/16”.
h. The exit device end caps shall be secured with three (3) screws to a truss bracket.
i. The “touchpad” exit devices shall be patterned punched to designate code requirements; where required.
j. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, plated to the standard architectural finishes to match the balance of the door hardware.

2.06 CLOSERS

Characteristics:

a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder; which have been tested and certified under ANSI / BHMA Standard A156.4, Grade 1.
b. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F (49 degrees C) to -30 degrees F (-35 degrees C).
c. Spring power shall be continuously adjustable over the full range of closer sizes, and allowing for reduced opening force for the physically handicapped. Hydraulic regulations shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed and back check.
d. All closers shall have solid forged steel main arms (and forearms for parallel arm closers) and where specified shall have a spring loaded stop in the soffit shoe (“SPRING CUSH-N-STOP”); as indicated in the Door Hardware Sets. Where door travel on out-swing doors must be limited, use SPRING CUSH-N-STOP type closers. Auxiliary stops are not required when SPRING CUSH-N-STOP type closers are used.
e. All closers shall have non-metallic full, plastic, covers, which provides complete enclosure.

f. All closers shall be certified to exceed Ten Million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers shall be of one manufacturer and shall maintain the manufacturer's ten year warranty.
g. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ADA and ANSI A117.1 provisions for door opening force.
h. All closers shall be attached utilizing Through Bolts with Wood and Machine Screws ("TBWMS").
i. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
j. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.

Lacquer or painted finish on metal components shall not be acceptable.

2.08 PUSH AND PULL UNITS

PULL UNITS:
Characteristics:
a. Tested to be in accordance with ANSI / BHMA A156.6, Grade 1.
b. Door Pulls shall be made of 1" diameter material, Semi-Circular offset, 11" Center-To-Center length, with a minimum of a 3-1/4" projection, and a 2-1/4" clearance. The door pulls shall comply with the recommendations of the Americans with Disabilities Act (A.D.A.).
c. Provide door pulls with 1/8" thick base washers; as indicated in the Door Hardware Sets.
d. Fasteners: Provide two (2) 5/16-18 x 2-1/4" machine screws with 1" Diameter Decorative Thru-Bolts.
e. Custom pulls shall be manufactured by Rockwood, product numbers listed in hardware sets.

PUSH PLATES:

Characteristics:
a. Tested to be in accordance with ANSI / BHMA A156.6, Grade 1.
b. Push Plates shall be made of .050" wrought, stainless steel material.
c. Where detailed, provide 8" x 16" "Half Circle".
d. Where detailed, provide push plates cut for a cylinder (CFC).
e. Provide exposed, Phillips oval head, stainless steel, sheet metal screw, mounting fasteners, for all plates.

2.09 PROTECTIVE PLATES

Characteristics:
a. Tested to be in accordance with ANSI / BHMA A156.6, Grade 1.
b. All mop, kick, and armor plates shall be US18 gauge (.050") thick of stainless steel material.

c. Fabricate mop plates not more than 1 inch less than door width, on the “PULL” side, kick plates not more than 1-1/2 or 2 inches less than door width, on the “PUSH” side, and armor plates not more than 1-1/2 inches less than door width, on the “PUSH” side.
d. Heights:
    (1) Mop Plates shall be 4 inches in height.
    (2) Kick Plates shall be 8 inches in height.
    (3) Armor Plates shall be 36 inches in height.
e. Where detailed bevel all four (4) edges (“B4E”).
f. Provide mop, kick, and armor plates with #6 x 5/8” Oval Head, Stainless Steel, Sheet Metal Screws.

2.10 THRESHOLDS

Characteristics:
a. All thresholds shall be certified by an independent testing laboratory to meet the requirements of ANSI / BHMA A156.21.
b. All thresholds shall be in accordance with the requirements of A.D.A.A.G. and ICC / ANSI A117.1.
c. Thresholds shall be furnished in an aluminum extrusion that is of alloy 6063 hardness T-5.
d. Provide thresholds with 1/4-20 Stainless Steel Machine Screws and Lead Anchors.

2.11 DOOR STOP

Characteristics:
a. Tested to be in accordance with ANSI / BHMA A156.16, Grade 1.
b. Wall Bumpers shall have a solid forged brass housing with a concealed, in the concave bumper, attachment. Provide with wood screw and plastic anchors.
c. Floor Stops shall be made from solid cast brass or bronze. Provide with machine screws and lead expansion shield anchors.
d. Install floor stops in such a position that they permit maximum door swing, but do not present a hazard or obstruction.

2.12 SILENCERS

Provide GJ-64 silencers for all hollow metal frames. Single doors shall have three (3) silencers. Double doors shall have two (2) silencers.

PART 3 – EXECUTION

3.01 APPLICATION

INSTALLATION: Work shall be done by a craftsman skilled and experienced in installation of finish hardware. Mortised items shall be neatly set in and made flush with door or frame surface. Manufacturer's instructions and recommendations shall be strictly followed.

FASTENERS: Hinges, pivots, locks, and exit devices shall be installed with proper sex bolts, wood or machine screws as supplied by the manufacturer. Surface closers shall be mounted to door with sex bolts. Door pulls shall be installed on doors with thru-bolts as supplied by manufacturer.

3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

    1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy to execute final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Supplier's Field Service:

3.04 Hardware Sets

Hardware Set 1 – Tag # 1

Ball Bearing Hinges	5BB1HW	NRP	4 ½ x 4 ½	630
Flush Bolts	FB458-12			
Mortise Exit	25M NL			
Mortise Cylinder	C987			
Closer	4040XP	H Cush		
Threshold	426 HD SIA			
Weather Strip	5075B			
Door Sweep	97VA			
Drip Cap	16A DW+6			