Specifications and Contract Documents
PHASE VI: SYSTEM-WIDE SCADA IMPROVEMENTS PROJECT

prepared for the

East Logan Water District

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East Logan Water District
Phase VI: System-wide SCADA Improvements Project

CONTRACT DOCUMENTS

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East Logan Water District

Phase VI: System-wide SCADA Improvements Project

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ADVERTISEMENT FOR BIDS

East Logan Water District
333 South Franklin Street
Russellville, KY 42276

RE: Phase VI: System-wide SCADA Improvements Project

The **East Logan Water District** will receive separate, sealed Bids for their **System-wide SCADA Improvements Project** until **10:00 a.m., Tuesday, November 20, 2018** at the office of East Logan Water District, 333 South Franklin Street, Russellville, Kentucky 42276, at which time they will be publicly opened and read aloud.

The Contract involves new construction and/or retro-fitting of multiple metering vaults or other above-ground structures; all in order to monitor hydraulic performance and parameters within the East Logan Water distribution system. The project will include the addition of a new and complete system-wide SCADA system plus various other piping, valves, accessories and associated electrical components in Logan County (KY) as described by the contract drawings and specifications. Bids will be received for a single prime Contract. Bids shall be on a lump sum basis.

The Issuing Office for the Bidding Documents is: McGhee Engineering, Inc., at P.O. Box 267, 202 South Ewing Street, Guthrie, Kentucky 42234 or by calling (270) 483-9985. Perspective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Fridays between the hours of 8:30-4:30 pm, and may obtain copies of the Bidding Documents from the Issuing Office as described below.

Plans must be ordered by visiting www.mcgheeengineering.com and clicking "**Bid Opportunities".** Plans will be sold with an option of Digital only OR Printed Set w/ Digital copy. Bids will be accepted only from registered contractors holding approved bid forms provided by the Issuing Office. Plan holders may be viewed at www.mcgheeengineering.com.

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

Published by the authority of the East Logan Water District
Harris Dockins, Chairman

Dated: October 30, 2018

INSTRUCTIONS TO BIDDERS

A. These Instructions to Bidders establish requirements for Bidding and Award of Contract.

B. Table of Articles

ARTICLE 1- DEFINED TERMS

Other terms used in the bidding documents and not defined elsewhere have the following meanings which are applicable to both the singular and plural thereof.

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

A. Bidder - The individual or entity who submits a Bid directly to OWNER.

B. Issuing Office - The office from which the Bidding Documents are to be issued.

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

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 must be used in preparing Bids; neither OWNER nor ENGINEER assume 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 confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within **10** 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."

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

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

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

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

4.01 *Site and Other Areas*

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

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

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.

B. 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.

C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.

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

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

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

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

4.04 *Owner's Safety Program*

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

4.05 *Other Work at the Site*

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

ARTICLE 5 – BIDDER'S REPRESENTATIONS

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

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

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

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

D. 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 If warranted, a pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective

ARTICLE 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. Addenda will be mailed no later than **three days** prior to the day set for receiving Bids. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any

obligations under the Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

7.03 Addenda may also be issued to clarify, correct, or change the Bidding Documents as deemed advisable by OWNER or ENGINEER.

7.04 Receipt of all addenda must be acknowledged in space provided in the Bid.

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to OWNER in an amount of **five percent (5%)** of the Bidder's maximum Bid price and in the form of a certified check or a Bid Bond (EJCDC No. C-430, 2013 Edition) 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 10 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 Substantial Completion or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE OR "OR-EQUAL" ITEMS

11.01 The Contract for the Work, if 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 a 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 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 A list of subcontractors, suppliers, individuals, or entities shall be submitted along with the Bid at the Bid Opening to the OWNER.

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, 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 in 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 must be typed or 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, alternative, 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. The corporate seal shall be affixed and attested by the secretary or an assistant secretary.

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 official address of the partnership shall be shown below the signature.

13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown below the signature.

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 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 typed or printed in ink below the signatures.

13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the number and dates of which must 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; COMPARISION OF BIDS

14.01 Bidders shall submit a Bid on a lump sum price basis for the Work on the Bid Form.

14.02 Bidders shall complete and submit with the Bid all such items as are identified as being part of the bid submittal.

14.03 Discrepancies between the price written in figures and price written in words will be resolved in favor of the price written in words.

ARTICLE 15 - SUBMITTAL OF BID

15.01 Bid Form is to be completed and submitted with all the attachments as required.

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 the location of the bid opening, as listed in the Advertisement.

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

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BIDS

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. 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 a period of **90 days**, 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 & AWARD OF CONTRACT

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

19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the responsive Bid deemed by the Owner to be in the best interest of the Owner, considering price and other elements of the 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 alternatives, unit prices, and other data as may be requested in the Bid form or prior to the Notice of Award.

B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those

portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

19.06 The Bid is subject to Kentucky Revised Statutes Section 45A.490 through 45A.494, which in general provides that a "resident bidder" of Kentucky is to be given a bidding preference over a "nonresident bidder" who is registered in a state that gives preference to its in-state resident bidders over a Kentucky resident bidder. The bidding preference is to be the same as that stipulated of the state of the "nonresident bidder." If the state of "nonresident bidder" provides no specific preference, then "resident" and "nonresident bidders" are to be treated the same when evaluating Bids.

19.07 The Bidder is required to attach to his Bid Form a detailed proposal which totals the lump sum amount submitted. This proposal should provide a detailed breakdown of the lump sum bid with unit pricing and thorough description of each component of the work, by location. Any proposed deviations or exceptions from the specifications must be thoroughly described in the Bidder's proposal. Any special provisions must be thoroughly described in the Bidder's detailed proposal, if warranted. **Note that the OWNER reserves the right to award only a portion of the work due to limited loan and grant funds available for the project. The detailed breakdown, submitted with the Bid Form, will be utilized to determine pricing for any warranted scope adjustments.**

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 insurances. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by the required performance and payment bonds and insurances.

20.02 All bonds required by the project shall be payable to the OWNER in an amount of one hundred percent of the Contractor's maximum Base Bid price less the value of materials purchased directly by OWNER/COMMISSION.

ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When the OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by a list of items and information required of the Successful Bidder for evaluation by the OWNER and funding agency, if applicable. Within **10** days thereafter, the successful Bidder shall deliver the full number of original copies of the items listed and the Notice must be acknowledged by the Successful Bidder within **10** days thereafter. After receipt of an acknowledged Notice of Award, a pre-construction meeting will be scheduled at which time the OWNER and Successful Bidder will execute the required number of Agreements and Notice to Proceed. After certification by the Local Counsel and any other required parties, the OWNER shall deliver one fully signed counterpart to the Successful Bidder along with a complete set of Drawings with appropriate identification. OWNER will furnish the Contractor up to three (3) sets of conforming Contract Documents, Technical Specifications and Plans free of charge. Additional sets may be obtained from the Engineer at commercial reproduction rates. The successful bidder shall commence work within ten (10) calendar days after receipt of written notice to proceed and shall progress therewith so that the work shall be completed in accordance with the terms of the Contract Documents within the time allowed after the date of the commencement of contract time.

21.02 **This Contract is expected to be funded in part with funds provided by the United States Department of Agriculture, Rural Utilities Service (RUS). RUS requirements will apply to the Project.**

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

ARTICLE 22 - RETAINAGE

22.01 Prior to Substantial Completion, OWNER will retain an amount equal to 5% of each progress payment application. Amounts previously retained shall not be paid to the CONTRACTOR until substantial completion of the Work. In no event shall the total Retainage be more than 5% of the value of the work satisfactorily completed.

22.02 Retainage shall be applicable to the Total Value of Work and Stored Materials less the Value of In-place OWNER Purchased Materials.

ARTICLE 23 – LICENSES, FEES, AND TAXES

23.01 The Bid shall include all taxes in effect at the time the Bid is submitted, unless specifically exempted in the Bidding Documents. No change will be allowed for taxes from which OWNER is exempt. Bidders who are uncertain as to what items are subject to tax, or who require further explanation or clarification, are requested to contact the State of Kentucky Revenue Cabinet.

23.02 Successful Bidder must comply with any City ordinances relating to Occupational License Fees, Business Licenses, payroll, and net profits taxes and any other ordinances which may apply to the project. Refer to the Supplementary Conditions SC-6.10 for additional information.

23.03 Successful Bidder must provide proof of having all such licenses or fees at or before the signing of the Contract, including a copy of the Bidder's State of Tennessee contractor's license.

ARTICLE 24 - WAGE RATE DETERMINATION

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.

24.02 Kentucky State Prevailing wage rates do not apply to any of the project.

24.03 Federal Davis Bacon wage rates do not apply to any of the project.

ARTICLE 25 – OTHER BID REQUIREMENTS

25.01 Bidder shall complete the following documents attached to the Bid:
List of Subcontractors
Statement of Experience
Statement pertaining to the Iran Divestment Act
Certification Regarding Debarment, etc.
Compliance Statement
Certification for Contract Grants and Loans

ARTICLE 26 – LAWS, ORDINANCES, AND REGULATIONS

26.01 Bidder must familiarize itself with all laws, ordinances, and regulations by federal, state, city, or other governmental agency, which by reason of being neglected or violated may affect the Work contemplated and must secure and pay the fee required for any permits which may be necessary unless such fees are otherwise indicated to be paid in the Bidding Documents.

ARTICLE 27 – INSURANCE

27.01 Before execution of Contract by OWNER, the successful Bidder shall furnish OWNER a certificate or certificates issued by or on behalf of insurers or a self-insurance program or group self insurance program, qualified to do business in the State of Tennessee plus the Commonwealth of Kentucky under KRS Chapter 304 or KRS Chapter 342, certifying that the successful Bidder complies

with the Worker's Compensation laws of Kentucky and is insured or indemnified against public liability claims which may arise out of the performance of the Work under the proposed Contract.

ARTICLE 28 – SAFETY STANDARDS AND ACCIDENT PREVENTION:

28.01 With respect to all work performed under this contract, the contractor shall:

Comply with the safety standards provision of applicable laws, building and construction codes and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal Regulations, Section 1518 as published in the "federal Register", Volume 36, No. 75, Saturday, April 17, 1971. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property. Maintain at his/her office or other well know place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.

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)*:

East Logan Water District
333 South Franklin Street
Russellville, KY 42276

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 as joint venturers, if necessary.

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

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

3. This obligation shall be null and void if:

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

3.2 All Bids are rejected by Owner, or

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

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

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

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

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

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

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

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

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

BID FORM

Project Identification: **East Logan Water District's Phase VI: System-wide SCADA Improvements Project**

Contract Identification: **System-wide SCADA Improvements Project**

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is Submitted to: **East Logan Water District, 333 South Franklin Street, Russellville, Kentucky 42276**

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 the Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGMENTS

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. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____

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

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

D. Bidder has carefully studied 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. 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

4.01 Bidder certifies that:

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

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

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

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

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything 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.

ARTICLE 5 – BASIS OF BASE BID

5.01 In compliance with the Advertisement for Bids, BIDDER hereby proposes to furnish all equipment, materials and labor for the work required for full and final completion of the "**System-wide SCADA Improvements Project**", in strict accordance with the CONTRACT DOCUMENTS, within the time set forth herein for the Lump Sum Base Bid amount of:

Total Lump Sum Bid Price for Base Bid Work	$

_____

Dollars ($)

Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.

Lump Sum Bid Price for Base Bid Work	$
Alternate Scope – 'Bucksville I' Site ☐ Add ☐ Deduct (check) Master Meter Improvements on Existing Vault per Detail 1 & 2, Sheet P-14, including new meter, new concrete floor, solar power upgrade, appurtenances, etc. Complete & ready for use.	$
Total Lump Sum Bid Price for Base Bid Work w/ Alternate	$

_____

Dollars ($)

Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.

5.02 General Supervisory System Supplier included in the lump sum bid is **(Check One)**:

Bidder proposes to Utilize:

☐ **HTI, Inc. (270.274.4632)**

☐ **Primex (763.559.0568)**

☐ **Integrated Process Solutions (608.549.4375)**

5.03 **The Bidder is required to attach to this Bid Form a detailed proposal which totals the lump sum for 'base bid work' amount above. This proposal should provide a detailed breakdown of the lump sum bid with unit pricing and thorough description of each component of the work, by location. Any proposed deviations or exceptions from the specifications must be thoroughly described in the Bidder's proposal. Any special provisions must be thoroughly described in the Bidder's detailed proposal, if warranted.**

5.04 SUPPLEMENTAL UNIT PRICES: The following Supplemental Unit Prices will apply in the event that additions to or deductions from the work required in the Bid are ordered. A single price shall be bid for each item. OWNER reserves the right to accept or reject these prices by inclusion in or omission from the Contract Documents to be executed after the award of the Contract.

Item	Type of Work	Unit	Supplemental Unit Price (Words)		(Numbers)
1.	Buried/Trenched Instrumentation Cable Type PLTC, Type ITC, 300V, 8 twisted Pairs, 18 AWG, PVC conductor insulation material, B/W numbered pairs, overall shielded, PVC jacket in 1.5" conduit; where ordered by the Engineer.	LF	_____.	Dollars	$_____.
2.	Buried/Trenched Instrumentation Cable Type PLTC, Type ITC, 300V, 8 twisted Pairs, 16 AWG, PVC conductor insulation material, B/W numbered pairs, overall shielded, PVC jacket in 1.5" conduit; where ordered by the Engineer	LF	_____.	Dollars	$_____.
3.	**Alternate New Site** – 'Dennis Road' Master Meter Vault w/ SCADA per Detail 2, Sheet P-13. Including all specified valves, power source, piping & appurtenances. Complete, in place & ready for use.	LS	_____.	Dollars	$_____.
4.	Chlorine Analyzer (4 max) installed within existing building/structure. Submersible rated, direct mount digital display with 2-wire loop powered to 4-20mA output to SCADA; where ordered by the Engineer.	EA	_____.	Dollars	$_____.
5.	Unclassified undercut, where ordered by the Engineer.	CY	_____.	Dollars	$_____.
6.	No. 57 aggregate refill, where ordered by the Engineer.	Ton	_____.	Dollars	$_____.
7.	Class "B" concrete refill, where ordered by the Engineer	CY	_____.	Dollars	$_____.

ARTICLE 6 – TIME OF COMPLETION

6.01 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.

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

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

A. Required Bid security in the form of a Bid Bond (EJCDC No. C-430) or Certified Check (circle type of security provided);

B. If Bid amount exceeds $10,000, signed Compliance Statement (RD 400-6). Refer to specific equal opportunity requirements set forth in the Supplemental General Conditions;

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

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

E. List of Subcontractors.

F. Statement of Experience

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

9.01 This Bid submitted by:

Submitted by:

_____ Signature	_____ Business
_____ Printed or Typed Name	_____ Bidder's Business Address
_____ Title	_____ City, State, Zip Code
_____ Employer's Tax ID No.	_____ Business Phone No. Business Fax No.
_____ Business Email Address	_____ Cell Phone No. Other Contact No.

9.02 Bid submitted on _____, 2018.

LIST OF SUBCONTRACTORS

The following SUBCONTRACTORS are proposed for work on the PROJECT.

No.	Subcontractor Name, Address & Phone No.	Work Item(s)
1.		
2.		
3.		
4.		
5.		
6.		
7.		

_____

Bidder

STATEMENT OF EXPERIENCE

The following list represents the most recent clients for whom similar work was performed by the BIDDER. The persons listed may be contacted as references. Provide at least four unique and non-Owner related project references.

No.	Contact Person, Company & Phone No.	Project Description, Date & Approximate Value of Work
1.		
2.		
3.		
4.		
5.		
6.		

_____

Bidder

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)

oOo

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 not 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(s) and Title(s) of Authorized Representative(s)

Signature(s) | Date

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 than 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 transactions," debarred," "suspended," "ineligible,", "lower tier covered transactions," "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 it 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 participation 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.

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 previsouly 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)

NOTICE OF AWARD

TO: _____
_____
_____
_____

PROJECT Description: **East Logan Water District**
Phase VI: System-wide SCADA Improvements Project

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated _____ and Instructions to Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $_____

You are required by the Instructions to Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER's acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

Within ten (10) days of your compliance of the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with an additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

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

Dated this _____ day of _____, 2018.

EAST LOGAN WATER DISTRICT

_____
Harris Dockins, Chairman

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged and dated this _____ day of _____ 2018.

(Contractor)

_____
Name, Title

SUGGESTED FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE) FUNDING AGENCY EDITION

THIS AGREEMENT is by and between **East Logan Water District** ("Owner") and

_____ ("Contractor").

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

The Work involves new construction and/or retro-fitting of multiple metering points in order to monitor hydraulic performance and parameters within East Logan Water District's distribution system. The project will include the addition of a new and complete system-wide SCADA system plus various other piping, valves, accessories and associated electrical components in Logan County (KY) as described by the contract drawings and specifications.

ARTICLE 2 – THE PROJECT

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

Phase VI: System-wide SCADA Improvements Project

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by **McGhee Engineering Inc.**

3.02 The Owner has retained **McGhee Engineering 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 within **180** days after the date when the Contract Time commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **210** days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner **$750** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **$500** for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 5 – CONTRACT PRICE

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

A. For all Work other than Unit Price Work, a Lump Sum of:

_____ _____

(words) (figure)

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 **first** 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); and

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

2. Upon Substantial Completion of the entire construction to be provided under the Contract Documents..

6.03 *Final Payment*

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

ARTICLE 7 – INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

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

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

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

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

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 6 inclusive).
2. Performance bond (pages 1 to 3 inclusive).
3. Payment bond (pages 1 to 3 inclusive).
4. Bid bonds (pages 1 to 2 inclusive).
5. General Conditions (pages 1 to 66 inclusive).
6. Supplementary Conditions (pages 1 to 3 inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. Drawings consisting of 18 sheets with each sheet bearing the following general title: Phase VI: System-wide SCADA Improvements Project:
9. Addenda (numbers * to *, inclusive).
10. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (pages 1 to 5 inclusive).
    b. Documents submitted by Contractor prior to Notice of Award – List of Subcontractors.
    c. Documents submitted by Contractor prior to Notice of Award – Statement of Experience.
11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    a. Notice to Proceed (pages 1 to 1, inclusive).
    b. Work Change Directives.
    c. Change Order(s).

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

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

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

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Contractor's Certifications*

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

1. "corrupt practice" means the offering, giving, receiving, or soliciting of 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 in the Supplementary Conditions.

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

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

OWNER:	CONTRACTOR
East Logan Water District	_____
By: _____	By: _____
Title: **Harris Dockins, Chairman**	Title: _____
[CORPORATE SEAL]	[CORPORATE SEAL]
Attest: _____	Attest: _____
Title: **Linda Alexander, Manager**	Title: _____
Address for giving notices:	Address for giving notices:
333 South Franklin Street	_____
Russellville, KY 42276	_____
_____	_____
	_____

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:
East Logan Water District
333 South Franklin Street
Russellville, KY 42276

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

_____ *(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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

the Owner or its heirs, executors, administrators, successors, and assigns.

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

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

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

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

14. Definitions

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

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

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

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

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

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

16. Modifications to this Bond are as follows:

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PAYMENT BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:

East Logan Water District
333 South Franklin Street
Russellville, KY 42276

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.

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:

NOTICE TO PROCEED

TO: _____ DATE: _____

_____ PROJECT: **East Logan Water District's Phase VI: System-wide SCADA Improvements Project**

_____

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 2018 on or before _____. In accordance with the Agreement, the date of substantial completion is _____, and the number of days needed to achieve readiness for final payment is **180**. In accordance with the Agreement, the date of final completion is _____, and the number of days needed to achieve readiness for final payment is **210**.

Before starting work at the site, Contractor mush comply with the following:

Not applicable.

EAST LOGAN WATER DISTRICT

_____

Harris Dockins, Chairman

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged and dated this ___ day of _____ 2018.

(Contractor)

_____

Name, Title

_____

Employer Identification Number

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

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

National Society of Professional Engineers®

Endorsed by

CSI NUCA
REPRESENTING UTILITY & EXCAVATION CONTRACTORS

These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

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.

Certificate of Owner's Attorney & Agency Concurrence

CERTIFICATE OF OWNER'S ATTORNEY

PROJECT NAME: **East Logan Water District's Phase VI – System wide SCADA Improvements Project**

CONTRACTOR NAME: _____

I, the undersigned, **Joe Hendricks**, the duly authorized and acting legal representative of **East Logan Water District**, do hereby certify as follows:

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

_____
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: _____ By: _____

Date: _____ Title: _____

Supplementary Conditions

A. 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.

B. 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.

C. 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.

D. Table of Contents

SC-1.01 Defined Terms

SC 1.01.A.3 Add the following language at the end of last sentence of Paragraph 1.01.A.3:

The Application for Payment form to be used on this project is RD Form 1927-7.

SC 1.01.A.8 Insert a comma and the word "Engineer" immediately after the word "Contractor" in this definition.

SC 1.01.A.8 Add the following language at the end of last sentence of Paragraph 1.01.A.8:
The Change Order form to be used on this Project is EJCDC C-941. Agency approval is required before Change Orders are effective.

SC 1.01.A.48 Add the following language at the end of the last sentence of Paragraph 1.01.A.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 given 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.

SC-2.01 Delivery of Bonds and Evidence of Insurance

Delete Paragraphs 2.01 B. and C. in their entirety and insert the following in their place:

B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.02 Copies of Documents

Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish the Contractor up to five copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

SC-2.03 Before Starting Construction

Add the following subparagraph to Paragraph 2.03:

4. a proposed listing of subcontractors and major material and equipment suppliers. The list shall include any proposed substitutions in accordance with Paragraph 7.05.

SC-2.05 Initial Acceptance of Schedules

Add the following language to the end of Paragraph 2.05.A.2:

The schedule for shop drawings shall show all submittals complete before 25% of completion of the Work and the schedule for maintenance manuals shall show all submittals complete before 50% of completion of the Work.

SC–3.03 Reporting Discrepancies

Add the following language at the end of Paragraph 3.03.A:

4. Contractor shall report apparent discrepancies to Engineer using a Request for Information form on a form supplied by Engineer. The Request for Information form shall:

a. be submitted by Contractor only;

b. be legible and complete;

c. not be used for the purposes of only confirming or verifying issues; and,

d. be prioritized by Contractor in the event that multiple Requests for Information are outstanding.

Requests for Information that are not in conformance with the requirements above shall be returned to Contractor without response.

5. Contractor shall not be relieved of its responsibility to coordinate the Work to prevent adverse impacts to Contractor's Project Schedule while submitting Requests for Information.

6. If Contractor believes the Scope of Work included in the Request for Information has a cost and/or time impact, Contractor should submit a claim in accordance with Article 12 of these General Conditions.

7. If Contractor proceeds with work when Contractor had actual knowledge or should have known that a conflict, error, ambiguity, or discrepancy existed as indicated above, correction of work constructed without such notification to Engineer shall be at Contractor's expense, (except in an emergency as authorized by Paragraph 7.15.A).

SC-3.04 Requirements of the Contract Documents

Delete Paragraph 3.04.C in its entirety.

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.

SC-4.03 Reference Points

Add the following new paragraph immediately after Paragraph 4.03.A:

B. CONTRACTOR is referred to the General Requirements for additional requirements for laying out the work.

SC-5.03 Subsurface and Physical Conditions

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-5.05 Underground Facilities

Add the following paragraph immediately after Paragraph 5.05.E:

F. Contractor is referred to the General Requirements for requirements for keeping records of Underground Facilities and allowing facility owners to inspect.

SC-5.06 Hazardous Environmental Conditions

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.

SC-6.01 Performance and Payment Bonds

Add the following new paragraphs immediately after Paragraph 6.01.F:

G. The forms of the performance and payment Bonds attached hereto shall be used for the Contract. Note instructions thereon as to the form applicable. Each form contemplates one corporate surety only. In case co-sureties or individual sureties will be furnished, proper forms therefore shall be obtained. Besides the stipulations of Paragraphs 6.01 through 6.03, the surety on the Bonds shall provide a certificate indicating surety is licensed to underwrite contracts in the jurisdiction of the project location which shall be attached to the Bonds.

H. Every Bond must run to Owner.

I. If the principal is an individual, his/her full name and residence shall be inserted in the body thereof, and he/she shall sign the Bonds with his/her usual signature on the line opposite the scroll seal. If the principals are partners, their individual names shall appear in the body of the Bonds,

with the recital that they are partners comprising a firm, naming it, and all the members of the firm shall execute the Bonds as individuals.

J. The signature of a witness shall appear in the appropriate places, attesting the signatures of each individual party to the Bonds.

K. If the principal is a corporation, the name of the state in which incorporated shall be inserted in the appropriate place in the body of the Bonds, and said instrument shall be executed and attested under the corporate seal as indicated on the form. If the corporation has no seal, the fact shall be stated, in which case a scroll or adhesive seal shall appear following the corporate name. This also applies to execution by surety.

L. The date of the Bonds must not be prior to the date of the Contract for which given.

M. The bond shall be signed by an individual authorized to sign on behalf of the surety and a power of attorney, authorizing the execution of the Bonds by an attorney-in-fact, or agent of the surety, shall be attached to one executed counterpart of the Bonds.

SC-6.03 Contractor's Insurance

Add the following to the end of Paragraph 6.03.C.7:

All additional insureds shall be endorsed on the policy as required in Paragraph 6.03.C.7. Endorsements shall not exclude supervisory or inspection services.

Delete Paragraph 6.03.C.8 in its entirety and add the following new paragraphs immediately after Paragraph 6.03.C.7:

8. Railroad Protective Liability Policy: Not applicable.

9. The types of insurance and the limits of liability indicated are the minimum required. Neither Owner nor Engineer warrant the adequacy of the types of insurance or the limits of liability required. Any policy exclusions shall be indicated on the insurance certificate. Contractor shall provide verification of all coverages with or on the insurance certificate.

10. Regardless whether or not an Owners' and Contractors' Protective (OCP) policy or Project Management Protective Liability (PMPL) policy is furnished, insurance certificates for commercial general, automobile, umbrella, and builders risk shall specifically indicate by name the additional insureds which are to include Owner and Engineer as well as other persons or entities so identified. Certificates shall be Acord 25-S or equivalent.

11. As an alternative to providing Form CG 20 10 10 01 or CG 20 10 07 04, Contractor may furnish to Owner an OCP policy or a PMPL policy with Owner as the named insured and Engineer as either an additional insured or a named insured. OCP policy or PMPL policy shall provide for bodily injury and property damage coverage equal to the sum of: the general aggregate limit for commercial general liability plus the amount specified for the umbrella coverage. OCP policy or PMPL policy shall provide coverage arising out of:

a. operations performed by Contractor at the project location.

b. acts or omissions in connection with the general supervision, inspection and/or coordination of such operations.

If an OCP or PMPL policy is provided, Contractor shall provide originals of the Final OCP or PMPL to all insured and additional insured parties.

12. Endorsements, OCP policy, PMPL policy, or General Liability policy shall not exclude supervisory or inspection services.

13. Contractor shall also provide an Additional Insured Endorsement for the automobile policy. Endorsement form shall be CA 20 48, or equal.

Change in Paragraph 6.03.I.3 the phrase "materially changed" to read "materially changed with respect to coverage on the project."

Delete Paragraph 6.03.J in its entirety and insert the following new paragraph in its place:

J. The stated limits of Paragraphs 6.03.K.1, 6.03.K.2, and 6.03.K.3 can be obtained through individual policies or in conjunction with an umbrella policy (pay on behalf form) to arrive at the total limits requested.

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
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	$ 2,000,000
Personal and Advertising Injury	$ 1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$ 1,000,000

General Aggregate Limits specified above shall apply separately to this project by attachment of:

"Amendment of Limits of Insurance–Designated Location(s) General Aggregate Limit Endorsement (ISO Form No. CG 25040509) or "Designated Construction Project(s) General Aggregate Limit" Endorsement (ISO Form CG 25030509) or equivalent endorsement coverage.

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Combined Single Limit of	$ 500,000

4. Excess or Umbrella Liability:

Per Occurrence	$ 1,000,000
General Aggregate	$ 1,000,000

5. Contractor's Pollution Liability:

Each Occurrence	$
General Aggregate	$

☒ If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

SC-6.05 Property Insurance

Delete from the first sentence of Paragraph 6.05.A.2, the phrase "All-risk" policy form and insert the following in its place:

"Cause of Loss-Special Form"

Delete from the first sentence of Paragraph 6.05.A.2, the phrase "(other than caused by flood)" and insert the following in its place:

"(including that caused by flood and hydrostatic pressure)"

Delete Paragraph 6.05.A.10 and insert the following in its place:

10. Not used.

Delete Paragraph 6.05.A.12 and insert the following in its place:

12. Not used.

Add the following to the list of items in Paragraph 6.05.A, as numbered items:

14. include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorneys fees and engineering or other consultants' fees, if not otherwise covered;

SC-7.02.B Labor; Working Hours

Amend the first and second sentences of Paragraph 7.02.B to state "...all Work at the Site shall be performed during regular daylight working hours, 7:00 am through 5:00 pm. Contractor will not perform Work on a Saturday, Sunday or any legal holiday unless approved by the Engineer."

SC-7.03.B Materials and Equipment Warranty

Add the following to the end of Paragraph 7.03.B:

Suppliers shall be deemed to impliedly warrant that their products and all component materials incorporated into them are suitable and fit for the intended use of such products and shall be free from defect in material, workmanship or design, such warranty to run to the benefit of Owner and Engineer. The foregoing applies whether the products or their component materials are specified in the Contract Documents or are of Supplier's design.

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 Paragraph a.3.

SC 7.04.A.1 Delete paragraph 7.04.A.1.a.4 in its entirety and insert "Deleted" in its place.

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), without prior written approval of the Owner.

SC 7.06.B Delete paragraph 7.06.B in its entirety and insert "Deleted" in its place.

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".

SC-7.08 Permits

Delete last sentence of Paragraph 7.08.A and add the following in its place:

> See General Requirements and technical specification sections for utility charge provisions.

Add Paragraph 7.08.B as follows:

> B. See General Requirements for additional permit information.

SC-7.10 Laws and Regulations

Add Paragraph 7.10.D as follows:

> D. Contractor shall comply with the following Kentucky Bidding & Wage Requirements:
>
> Kickback Statutes–Contractor shall comply with the requirements of KRS 45A.455 with respect to gratuities and kickbacks among other matters.
>
> Campaign Finance Disclosure–Contractor shall comply with requirements of

KRS 45A.395 with respect to campaign finance laws.

Labor Law Disclosures–Contractor shall comply with requirements of KRS 45A.343 with respect to labor law disclosure.

Payment Bond for Wages Due–Contractor, whether a corporation, partnership, or individual, who have not been doing business in the State of Kentucky for five consecutive years, shall comply with KRS 337.200 which requires a Performance Bond to assure payment of wages.

SC-7.11 Record Documents

In Paragraph 7.11.A delete last sentence and insert the following:

Upon completion of the Work, these record documents, samples, and shop drawings shall be delivered by Contractor to Owner.

SC-7.13 Competent Person

Add the following new paragraph immediately after Paragraph 7.13.A:

B. Contractor shall keep at the Site at all times during the progress of the Work a competent person to comply with OSHA trenching and excavation requirements. The competent person shall be one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

SC-7.16 Shop Drawings

Add the following new paragraphs immediately after Paragraph 7.16.E:

F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.

G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

SC-7.18 Indemnification

Add the following to the end of Paragraph 7.18.A:

In addition, Contractor shall indemnify, hold harmless, and pay for the defense of Owner and Engineer from and against claims, losses, or damages in regard to any act or failure to act by Owner or Engineer in connection with general supervision, inspection and/or coordination of Contractor's operations.

Contractor shall, at its own expense, appear, defend, and pay all fees of attorneys and all costs and other expenses arising therefrom or incurred in connection therewith; and, if any judgments shall be rendered against any individual or entity indemnified hereunder in any such action, Contractor shall, at its own expense, satisfy and discharge same. Contractor expressly understands and agrees that any Letter of Credit or insurance protection required by the Contract, or otherwise provided by Contractor, shall in no way limit the responsibility to indemnify, keep and, save harmless, and defend any individual or entity indemnified hereunder as herein provided.

Delete Paragraph 7.18.C.1 and 7.18.C.2. Insert new Paragraphs 7.18.C.1 and D:

1. the preparation of Drawings, Specifications, or Property Surveys.

D. For any matter for which Owner and Engineer are indemnified under Paragraph 7.18.A, Contractor shall pay for Owner's and Engineer's reasonable defense, 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 or awards until Owner or Engineer are found negligent. If Owner or Engineer are found negligent, Owner or Engineer shall reimburse Contractor for the prorata extent of Owner's or Engineer's negligence for the cost of Owner's or Engineer's reasonable defense.

SC-7.19 Delegation of Professional Design Services

Add the following new paragraphs immediately after Paragraph 7.19.E:

F. The design professional providing the design calculations and design drawings shall be licensed in the State of the Project.

G. The design calculation and design drawings are not shop drawings, but shall be submitted to ENGINEER separately along with the required shop drawings for the system, material, or equipment specified. These calculations will be forwarded to OWNER for their records.

SC-10.03 Project Representative

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.

SC-11.01 Amending the Contract Documents; Changes in the Work

Delete Paragraph 11.01.A.1.b in its entirety.

SC-11.02 Owner-Authorized Changes in the Work

Amend the second sentence in Paragraph 11.02.A to read as follows: Such changes shall be supported by ENGINEER's recommendation.

SC-11.04 Change of Contract Price

Add the following sentence at the end of paragraph 11.04.B.2:

> Any overhead and profit allowance for lump sum work shall be in accordance with paragraph 11.04.C.2. unless OWNER and CONTRACTOR agree that these allowances are not appropriate for the Work involved.

SC-11.06.B Change Proposals

Delete Paragraph 11.06.B in its entirety.

SC-11.07 Execution of Change Orders

Delete Paragraphs 11.07.A and 11.07.B in their entirety and insert the following in their place:

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER covering:

1. Changes in the Work which are: (a) ordered by OWNER pursurant to Paragraph 11.02, (b) required because of 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;

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

3. Changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to Paragraph 12.01; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 4.04.B.

4. All Contract Change Orders must be concurred by Agency before they are effective or can be eligible for reimbursement.

SC-11.08 Notification to Surety

Add the following new paragraphs immediately after Paragraph 11.08.A:

B. Contractor shall be responsible for notifying the surety of any assignment, modification, or change of the Contract, change in the Work covered thereby, or extension of time for the completion of the project.

C. Failure to provide notice to the surety of any such change shall not exonerate the surety from its obligations under the bond.

SC-12.01.A Claims Process

Insert the following immediately after "Claims Process" in Paragraph 12.01.A:

> All Claims, except those waived pursuant to Paragraph 15.07, shall be referred to ENGINEER for decision. A decision by ENGINEER shall be required as a condition precedent to any exercise by OWNER or CONTRACTOR of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

Delete Paragraph 12.01.A.3 in its entirety.

SC-13.03 Unit Price Work

Delete Paragraph 13.03.E in its entirety and insert the following in its place:

E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

> 1. If the Bid price of a particular item of Unit Price Work amounts to 15% or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25% from the estimated quantity of such item indicated in the Agreement; and
>
> 2. If there is no corresponding adjustment with respect to any other item of Work; and
>
> 3. If Contractor believes that it has incurred additional expense as a result thereof; or
>
> 4. If Owner believes that the quantity variation entitles it to an adjustment in the unit price,
>
> either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SC-14.02.A Tests and Inspections

Add the following to the beginning of Paragraph 14.02.A:

All Work is subject to testing to indicate compliance with Contract Document requirements. Duplicate copies of test results of all tests required shall be submitted to Engineer. Tests and inspection of work may be conducted by Owner or an independent laboratory employed by Owner. Tests may also be performed in the field by Engineer as a basis for acceptance of the Work.

Add the following to the end of Paragraph 14.02.A:

Samples required for testing shall be furnished by Contractor at no cost to Owner. In the event that completed Work does not conform to specification requirements during the initial test, the Work shall be

corrected and retested for conformance. The entire cost of retesting completed Work shall be borne by Contractor. This shall include the extra cost for inspection to Owner which will be deducted from the final amount due Contractor.

SC-15.01 Progress Payment

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 RD Form 1924-18. 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."

SC-15.04 Partial Utilization

Add the following new paragraph immediately after Paragraph 15.04.A.3:

> 4. Owner may at any time request Contractor in writing to permit Owner to take over operation of any part of the Work although it is not substantially complete. A copy of such request will be sent to Engineer, and within a reasonable time thereafter, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the list of items to be completed or corrected and will deliver such lists to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties, and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

Paragraph 15.04.A.4 shall be renumbered to 15.04.A.5.

SC-15.08.A Correction Period

Delete in Paragraph 15.08.A the phrase "If within one year after the date of Substantial Completion" and insert in its place the following:

"If thereof began operating or was used in a continuous, satisfactory manner for its intended purpose within one year of the date of final payment or from the date established by Engineer that the Work or portion, whichever is earlier,"

SC-16.02 Owner May Terminate for Cause

Add the following new paragraphs immediately after Paragraph 16.02.B.2:

3. complete the Work as Owner may deem expedient at the expense of Contractor and surety;

4. apply the amounts retained from partial payments to the completion of the Work; and

5. authorize the surety to complete the steps in Paragraphs 16.02.B.1 through 4.

SC-16.03 Owner May Terminate for Convenience

Add the following paragraph after Paragraph 16.03.B:

C. Contractor shall require similar provisions contained in Paragraph 15.03 in each of its subcontracts to protect Contractor from claims by Subcontractors arising from the Owner's termination for convenience, or to minimize claims by such subcontractors. The remedy provided to Contractor under this Paragraph 16.03 shall be Contractor's sole remedy in the event of termination for convenience by Owner.

SC-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.

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 "Certificate of Owner's Attorney" 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 – Environmental mitigation measures for the Project are noted on the Plan Sheets.

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
	$	$
TOTALS	$	
NET CHANGE IN CONTRACT PRICE	$	

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 _____ _____
(Owner's Architect/Engineer) *(Date)*

Accepted _____ _____
(Contractor) *(Date)*

Approved by Agency _____ _____
(Name and Title) *(Date)*

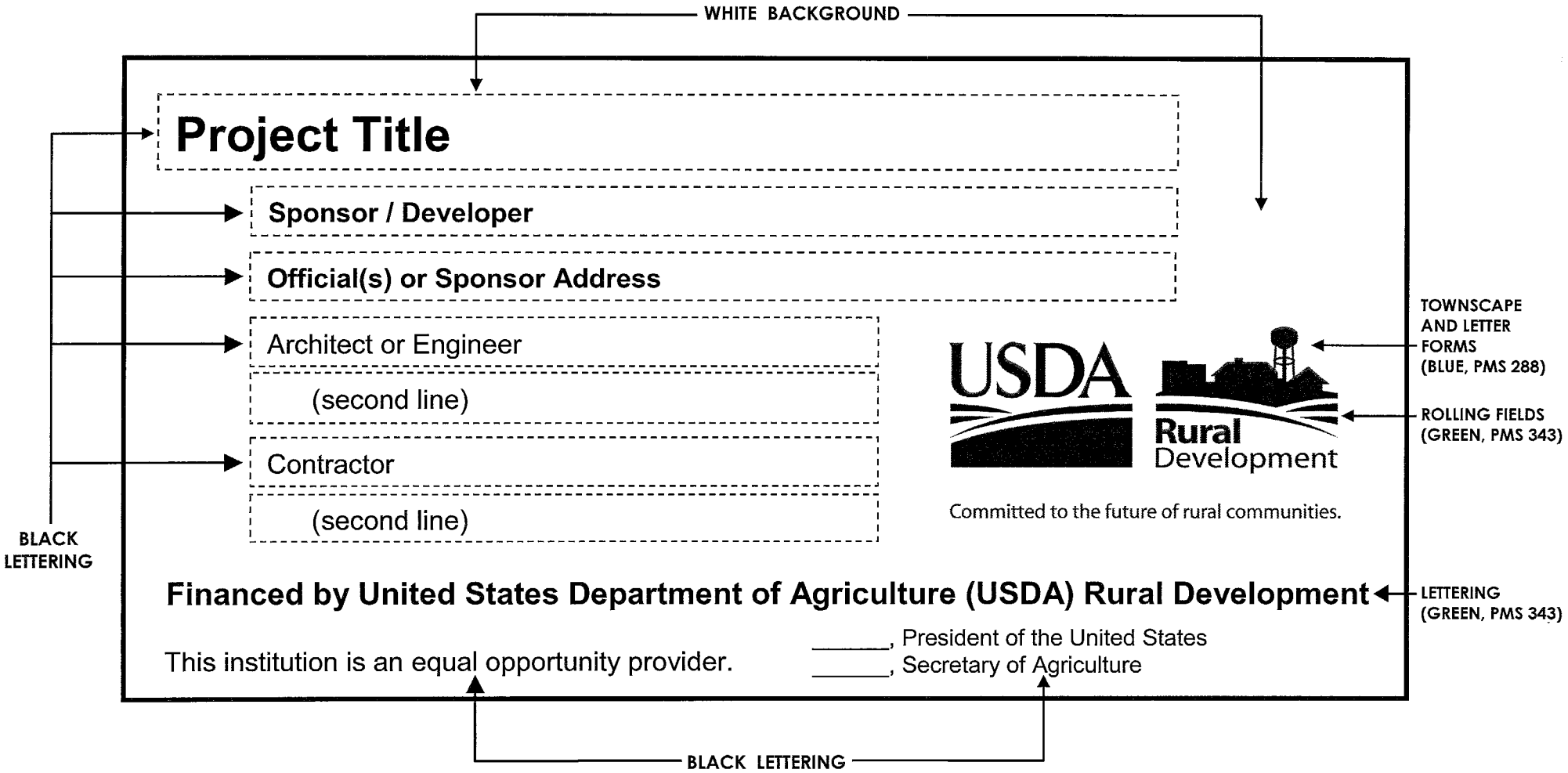
Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to U.S. Department of Agriculture, Clearance Officer, STOP 7602, 1400 Independence Avenue, S.W., Washington, D.C. 20250-7602. ***Please DO NOT RETURN this form to this address.*** *Forward to the local USDA office only. You are not required to respond to this collection of information unless it displays a currently valid OMB control number.*

POSITION 6

Form RD 1924-7 (Rev. 2-97)

ORIGINAL-BORROWER'S CASE FOLDER

TEMPORARY CONSTRUCTION SIGN FOR RURAL DEVELOPMENT PROJECTS



SIGN DIMENSIONS: 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x ¾")
PLYWOOD PANEL (APA RATED A-B GRADE–EXTERIOR)

PROJECT SPECIAL CONDITIONS

1. Project Special Conditions: These Special Conditions supplement the "Standard General Conditions" and the "Supplementary Conditions" within the Contract Documents. The Engineer's decision shall be final as to interpretation and/or conflict between any of the reference specifications and standards contained herein.

2. Additional Definitions: Wherever the following terms are used in these specifications, their meaning shall be construed in accordance with the definitions fisted below.

   a. Engineer: McGhee Engineering, Inc., P.O. Box 267, 202 Ewing Street, Guthrie, Kentucky 42234, telephone (270) 483-9985.

   b. Inspector: Representative of the Engineer or Owner stationed at, or visiting the site of the work to secure conformity with the Plans and Specifications, to record the work performed by the Contractor and to serve in such other capacities as the Engineer may direct.

   c. Plans: All drawings adopted by the Engineer and bound herein pertaining to the work under this contract.

   d. ASTM Specifications: Adopted by the American Society for Testing and Materials, governing the methods and procedures for manufacturing and testing materials and bearing appropriate alphabetical and numerical designations pertinent to the various items involved.

   e. OSHA: Occupational Health and Safety Administration requirements pertaining to the project.

3. The following abbreviations will be used in these Specifications, the Proposal and contract:

LF or L.F.	Linear Foot
SF or S.F.	Square Foot
LS or L.S.	Lump Sum
EA or Ea	Each
SQ. IN.	Square Inch
LBS.	Pounds
LIN. IN.	Linear Inch

4. Safety Standards and Accident Prevention: With respect to all work performed under this contract, the contractor shall:

   4.1 Comply with the safety standards provision of applicable laws, building and construction codes and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal Regulations, Section 1518 as published in the "federal Register", Volume 36, No. 75, Saturday, April 17, 1971.

   4.2 Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.

   4.3 Maintain at his/her office or other well know place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.

5. Completion Time and Liquidated Damages: The project as indicated in the Plans and Specifications shall be completed within the number of consecutive working days stated in the Contract. Contractors shall submit any request for time extensions at the time of submission of the pay request covering the period

during which the time extension is requested, and such requests shall include justification in conformance with the Contract. Failure to make timely submittal of requests for time extension shall be grounds for their denial. The times set forth in the Proposal for completion of work are an essential element of the Contract. The Contractor and Owner understand and agree that a breach of this Contract as to completion on time will cause damage to the Owner. The parties agree that for each and every calendar day the work or any portion thereof shall remain uncompleted after the expiration of the contract time limit, **An amount specified and under the provisions of the Agreement** will be deducted from the money due or to become due the Contractor, not as a penalty, but as liquidated damages and added expense of engineering and overhead.

6. Contractor's Warranty: The Contractor shall guarantee that all work performed under this Contract is new and free of faulty materials in every particular, and free of faulty workmanship, and he does hereby agree to maintain, replace or re-execute without additional cost to the Owner such work found to be unsatisfactory and to make good all damage to his, or work by others affected by this Contract as a result of improper workmanship and materials or due to such required replacement or re-execution.

   The Contractor shall warrant all such work for a period of one (1) year from the date of acceptance of all work performed under this Contract. A "Final Certificate" will be issued by the Engineer, as evidence. Neither the "Final Certificate," nor payment, nor any provisions in the Contract Documents shall relieve the Contractor of the guarantee or maintenance provisions, or his responsibility for neglect or the replacement of faulty materials, or workmanship, or any other items of defect during the warranty period.

7. Safety: The Contractor shall be responsible for the safety of himself, his employees and other persons, as well as for the protection of the safety of the improvements being erected and the property of himself or any other person, as a result of his operation. All work shall be done in accordance with the Occupational Safety and Health Administration regulations and all other current federal, state and local laws pertaining to occupational safety, health and welfare. All monitoring and testing required to assure compliance with such requirements shall be the responsibility of the Contractor. The safety of the public, protection of property, and convenience of traffic shall be of prime importance during construction. In all respects, public safety and protection of property and provisions therefore, made necessary by the work, shall be the direct responsibility of the Contractor and shall be performed at his expense.

8. Contractor's Responsibility for Materials and Equipment: The Contractor shall assume full responsibility for all supplies, materials and equipment furnished or installed by him for the work he contracts to do, whether furnished by him or by other parties, until the same shall have been installed and finally tested and accepted by the Engineer. The Contractor shall, therefore, insure such property against loss or damage while stored at the site of the work.

9. Permits, Licenses and Laws: The Contractor shall obtain, at his own expense, all necessary permits and licenses from the proper authorities and shall give all notice required by law or ordinance and shall pay all fees and charges incidental to the due and lawful prosecution of the work and shall comply with all laws, ordinances and regulations relating thereto. Contractor shall obtain necessary building permits; however, there shall be no fees charged to the Contractor by the Owner.

   The Owner shall not be responsible to the Contractor for expenses incurred while performing the work under this contract due to the requirements and conditions imposed on the Contractor by any governmental agencies. The Contractor shall investigate with said government as to the requirements and conditions to be imposed.

   Copies of said permits, licenses, authorizations or regulations shall be filed with the Owner through the Engineer or his representative. In the event that any work to be performed by the Contractor under the above mentioned permits is found to be unsatisfactory and is not approved by the aforementioned governmental authorities, the cost thereof shall be charged to the Contractor and shall be withheld by the Owner from any money due to the Contractor under the subject construction contract.

10. Labor Laws: The Contractor shall comply with, and shall cause all subcontractors to comply with, the requirements of all applicable labor laws (hours of work, minimum wage, prevailing wage, etc.).

11. Protection of Adjoining Property: Any damage to any property of the Owner or other caused by the Contractor's operations shall be corrected at the Contractor's expense.

12. Cleanup: Upon completion of the work and before acceptance and final payment by the Owner, the Contractor shall remove rubbish, unused materials and temporary structures from the limits of the project and restore, in a manner acceptable to the Engineer, all property both public and private that has been damaged during prosecution of the work, and shall level and grade all portions of the work where the surface of the ground or street surface has been disturbed during construction and shall leave the site of the work in a neat and presentable condition, free from ruts and holes. Areas where vegetation is disturbed by construction shall be graded and re-seeded to the satisfaction of the Owner.

    Materials associated with the project shall not be deposited on adjacent property unless prior approval has been obtained from the property owner involved.

    No extra payment will be made for these cleanup requirements, its cost being included in the various unit prices bid in this proposal.

13. Resident Construction Observation: The Owner will employ the services of a resident construction observer during construction of the project. The purpose of the resident construction observer is to provide additional assurances to the owner as to the quality of the work and the conformance of the work to the plans and specifications. The resident construction observer is not provided to act as a supervisor of the contractor's activities, nor to take responsibility for the quality or safety of the contractor's work. Such responsibilities remain exclusively with the contractor.

14. Basis of Payment: The basis of payment for all items involved with the project will be made according to the units described in the Proposal breakdown. If there are any conflicts between the basis of payment described in the Specification and the units described in the Proposal breakdown, then the Proposal breakdown will prevail.

15. Inclement Weather: The basis of contract time is calendar days. If during the course of the project, weather conditions prevail that preclude performance of productive work for a number of days in excess of that which would normally be expected for the period, the Contractor may request a compensating time extension.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1–GENERAL

1.01 DIVISION ONE

A. The requirements of Division 1 apply to all sections of the Contract(s).

1.02 PROJECT SCOPE

A. CONTRACTOR shall provide all items, articles, materials, operations or methods mentioned or scheduled on the Drawings or herein specified: including all labor, supervision, equipment, incidentals, taxes and permits necessary to complete the Work as described within the Contract Documents. CONTRACTOR shall install all items provided by OWNER as mentioned or scheduled on the Drawings or herein specified.

1.03 CONTRACT DOCUMENTS–INTENT AND USE

A. Intent of Documents:
   1. Singular notations and specifications shall be considered plural where application is reasonably inferred.
   2. Mention or indication of extent of work under any division or Specification section is done only for convenience of CONTRACTOR and shall not be construed as describing all work required under that division or section.
   3. Some individual sections may contain a list of related sections. The list of related sections in individual sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. CONTRACTOR may not rely upon this listing for determination of scope of work. Other sections of the Specifications, not referenced in individual sections shall apply as required for proper performance of the Work.
   4. Command type sentences may be used in the Contract Documents. These sentences refer to and are directed to CONTRACTOR.
   5. Symbols for various elements and systems are shown on the Drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from ENGINEER.

B. Use of Documents:
   1. CONTRACTOR shall examine all Specifications and Drawings for the Work, including those that may pertain to Work CONTRACTOR does not normally perform with its own forces.
   2. CONTRACTOR shall use all of the Project Drawings and Specifications:
      a. For a complete understanding of the Project.
      b. To determine the type of construction and systems required.
      c. For coordination with other contractors.
      d. To determine what other work may be involved in various parts or phases.
      e. To anticipate and notify others when work by others will be required.
      f. And all other relevant matters related to the project.
   3. CONTRACTOR is also bound by all requirements of the Contract Documents which are applicable to, pertain to, or affect its Work, as may be shown or inferred by the entire set of Project Drawings and Specifications.

1.04 CONSTRUCTION REQUIREMENTS

A. General Information and Requirements:
   1. The East Logan Water District operates a rural water system on a 24-hour basis. CONTRACTOR may work on this Project during the daylight hours, Monday through Friday, except legal holidays. If the CONTRACTOR wishes to work at other times, a request must be

submitted to OWNER at least 72 hours in advance and approved by the OWNER and the ENGINEER.

2. It shall be the responsibility of CONTRACTOR to not in any way impair the normal treatment or operation efficiency of the facilities, regardless of the Work underway. CONTRACTOR shall provide all temporary piping, temporary electrical, and temporary construction required to meet the requirements of this section and to complete the Work.
3. Operation of the water supply and treatment facilities will be the responsibility of OWNER. CONTRACTOR shall cooperate with the water utility operation staff at all times, and removal of any operating units from service shall be coordinated by CONTRACTOR with OWNER and ENGINEER. Prior to removing or placing any unit process in or out of service, CONTRACTOR shall request in writing authorization from OWNER. CONTRACTOR shall attach to all requests for placing unit process in service, the laboratory results for bacteriological test showing that safe samples were obtained.
4. If required, the CONTRACTOR shall coordinate taking storage tank stations out of service and placing storage tank stations back in service with OWNER.
5. CONTRACTOR shall maintain tank site and remote station roadways open at all times to meet OWNER's requirements. CONTRACTOR shall be responsible for maintaining roadways in drivable conditions.
6. Outage Plan: CONTRACTOR shall submit for review, a detailed outage plan which includes time scheduled for work activities necessary to remove each storage tank station from service. The plan shall be in writing and also in the form of a bar graph. The outage plan shall be coordinated with the work construction schedule and shall be updated monthly. The outage plan shall follow the construction sequence specified herein and shall include the length of time required to complete said work. The length of time each storage tank station is out of service shall be minimized. To that end, all new equipment, tools, materials required for the Work shall be readily available when outage is implemented to minimize down time of unit processes.
7. CONTRACTOR shall submit for review, a detailed plan that includes time scheduled for work activities necessary to install and place in service the remote metering stations. The plan shall be in writing and also in the form of a bar graph. The installation plan shall be coordinated with the work construction schedule and shall be updated monthly.

1.05 CONTRACTOR USE OF SITE

A. General:
   1. The "area of the site" referred to in these specifications shall be considered the OWNER's property lines, the project right-of-way or the easements obtained for the project.
   2. Construction activities shall be confined within the "area of the site" limits.
   3. From the start of work to completion CONTRACTOR is responsible for the care of the site and the premises which are affected by operations of Work of this Contract.
   4. Except for permanent site improvements provided under the Contract, CONTRACTOR shall restore property disturbed during the Work, to the conditions which previously existed.
   5. Work in occupied spaces shall be restricted to specified Work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with OWNER.

B. Parking and Deliveries:
   1. CONTRACTOR is responsible for control of traffic by vehicles and persons within the limits of its operations.
   2. Parking for employees, subcontractors, and agents of CONTRACTOR shall be in areas subject to approval of OWNER.
   3. Access to the site for delivery of construction material or equipment shall be subject to approval of OWNER.

1.06 EXISTING SERVICES, STRUCTURES AND UNDERGROUND FACILITIES

A. Interruption of existing services and systems including heating, ventilating, air conditioning, water, sanitary, lighting and power, signal and security systems, and similar work shall be kept to an absolute minimum and shall be limited to times approved by OWNER.

B. If deemed necessary by OWNER, such work shall be accomplished during a specified time.

C. Work shall not commence until all labor, materials and equipment are available so Work can continue without interruption or delay.

D. Should uncharted or incorrectly charted piping or other utilities be encountered during installation, notify OWNER and consult with utility owner immediately for directions.

E. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation and repair any damaged utilities to satisfaction of utility owner.

F. CONTRACTOR shall not interrupt existing utilities serving facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.

G. Any accidental interruption of services shall be repaired immediately, including provision of temporary facilities until permanent repairs can be made.

H. Prior to any excavation, demolition, or drilling on site, CONTRACTOR shall contact owners of the underground facilities in and near the construction area of the intent to excavate, demolish, or drill. As part of this notification requirement, CONTRACTOR shall contact the utility notification service Kentucky 811 (811 or 1-800-752-6007) at least two but not more than 10 business days in advance of any work. CONTRACTOR shall be aware that not all owners participate in Kentucky 811. A call to this agency shall not absolve CONTRACTOR of the requirements for contacting all owners of underground facilities in and near the construction area. CONTRACTOR shall give reasonable advance notice to Kentucky 811 and other owners–such notification shall not be less than the minimum advance notification required.

I. CONTRACTOR shall proceed with caution in the excavation and preparation of the Site so the exact location of structures and Underground Facilities can be determined. CONTRACTOR shall include in the Contract Price any costs for temporary or permanent relocations of such structures and Underground Facilities required to complete the Work unless specifically indicated otherwise in the Specifications.

J. CONTRACTOR shall keep an accurate and complete record of all such structures and Underground Facilities encountered and shall provide OWNER a copy of this record. The record shall include a description of the item encountered, opinion as to conditions, and adequate measurements and depths so that the item can be located in the future.

K. CONTRACTOR shall inspect all structures and Underground Facilities for condition and soundness. Unsound conditions shall be reported to the structure or facility owner immediately after exposing. CONTRACTOR shall not proceed with the work until the structure or facility owner has been notified. OWNER shall then be given time to inspect and correct, if required, the structure or Underground Facility.

L. Any additional costs incurred because of failure of CONTRACTOR to report the condition of any and all existing structure or Underground Facility encountered shall be paid for by CONTRACTOR.

M. Whenever ENGINEER feels it is necessary to explore and excavate to determine the location of existing structures and Underground Facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is required to perform additional work in making the explorations and excavations, extra compensation will be allowed as provided for in the General Conditions.

1.07 PROTECTION OF WORK AND IMPROVEMENTS

A. CONTRACTOR shall protect the property of OWNER, existing improvements, and the Work installed by CONTRACTOR and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.

B. CONTRACTOR shall provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.

C. CONTRACTOR shall keep property, existing improvements and the Work, including structures, mains, fittings and accessories free from dirt and foreign matter at all times.

D. CONTRACTOR shall provide temporary plugging of openings, holes and pipe ends that are existing or that CONTRACTOR has installed.

E. Property, improvements and Work damaged by CONTRACTOR shall be repaired or replaced by CONTRACTOR to the satisfaction of OWNER.

1.08 AVAILABILITY OF LANDS

A. Easements were not obtained for this project. CONTRACTOR shall contain its operation to within the rights-of-way or lands upon which the work is to be performed.

1.09 LAWS

A. Contractor shall fully comply with all applicable laws, ordinances, rules, regulations, orders and other legal requirements, and shall bear the cost of such compliance.

1.10 CHARACTER OF WORKMEN

A. Contractor shall employ workman and foremen with sufficient knowledge of and experience in the type of work proposed to assure satisfactory performance. Workman shall maintain a professional demeanor and appearance at all times on the project. Any workman on the project who performs work in an incompetent manner, or acts in a disorderly or intemperate manner shall be removed from the project, and may not be employed on any portion of the project unless approved by the Owner.

1.11 INSPECTION

A. Provide at all times, access to the work for inspection by representatives of the Owner, the Engineer, and regulatory authorities having jurisdiction over the project.

1.12 PROJECT SIGN

A. The Contractor shall prepare and install the specified project signs as shown herein, shall maintain the signs in good repair for the duration of the project, and shall remove and dispose of the signs upon completion of the work.

1.13 CONSTRUCTION PROGRESS MEETINGS

A. The Contractor shall designate a Project Manager who shall be responsible for attending monthly board meetings to report on project progress and to respond to questions from the Board of Directors and the public. Monthly board meetings are typically conducted on the last Tuesday of each month at the District's office. The Contractor shall attend other project related meetings from time to time as designated by the Engineer.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-010

SECTION 01 019

CONTRACT CONSIDERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Measurement and Payment–Lump Sum.

1.02 MEASUREMENT AND PAYMENT–LUMP SUM

A. No separate measurement for payment will be performed for Lump Sum Work. The CONTRACTOR shall prepare a detailed schedule of values for each location and submit the schedule to the ENGINEER for review. The approved schedule will be utilized for partial pay estimates.

B. CONTRACTOR shall estimate percentage of Work completed. ENGINEER will review CONTRACTOR's estimate of quantity of Work completed.

C. Payment will be made based on the percentage of the Contract completed less retainage and/or liquidated damages.

D. Unless noted otherwise, all Work described in the Specifications and/or shown on the Drawings shall be included in the Lump Sum Bid.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-019

SECTION 01 039

COORDINATION, FIELD ENGINEERING, AND MEETINGS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Coordination.
   2. Field engineering.
   3. Progress meetings.

1.02 COORDINATION

A. CONTRACTOR shall coordinate scheduling, submittals, and work of the various sections of the work to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. See Section 01-010–"Summary of Work" for specific construction sequence.

B. CONTRACTOR shall verify utility requirements and characteristics of operating equipment are compatible with electric utilities and coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. CONTRACTOR shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Drawings and shall follow routing shown for pipes and conduit, as closely as practicable; place runs parallel with line of the structure. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. CONTRACTOR shall coordinate completion and clean up of Work of separate sections in preparation for substantial completion and for portions of Work designated for OWNER's occupancy.

E. After OWNER acceptance, CONTRACTOR shall coordinate access to Site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of OWNER's activities.

F. Project Schedule
   1. Prior to beginning field work on the project, CONTRACTOR shall prepare a detailed construction schedule for the entire project. The schedule shall be presented in bar chart form and shall identify major work item durations, milestones, and sequence of work. The schedule shall be presented on a single sheet of paper no larger than 24-inch by 36-inch and shall be submitted within 14 days of notice to proceed.
   2. At monthly intervals, corresponding to submission of pay requests, CONTRACTOR shall submit an updated project schedule. The updated schedule shall compare current status of the work with the projected status. Any tasks identified as being behind schedule shall be addressed in a separate narrative report detailing steps to be taken to reestablish schedule compliance. Pay requests may not be processed until an acceptable, corresponding schedule update is submitted. Three copies of the schedule and each update are to be submitted to ENGINEER.

1.03 FIELD ENGINEERING

A. CONTRACTOR shall locate and protect property stakes, legal survey monuments, benchmarks, and survey control and reference points. CONTRACTOR shall pay for replacement of disturbed property stakes and legal survey monuments by a Registered Land Surveyor acceptable to OWNER and for replacement of benchmarks and survey control and reference points provided by ENGINEER.

B. CONTRACTOR shall provide field engineering services as required to establish elevations, lines, and levels, utilizing recognized engineering survey practices.

C. CONTRACTOR shall furnish all required plummets and graduated poles to check all Work.

D. If stakes and boards have to be reset because of negligence of CONTRACTOR, CONTRACTOR shall bear the cost of such work.

E. If laser beam is used, CONTRACTOR shall check its Work against intermediate grade stakes provided between manholes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.

F. If existing property stakes, not within the limits of the trench, are removed or damaged by CONTRACTOR, CONTRACTOR shall bear the cost of replacement. Replacement shall be made by a legal survey performed by a licensed Land Surveyor hired by OWNER. Cost for survey shall be deducted from the Contract Price.

G. CONTRACTOR shall be responsible for all lines, elevations, and measurements of buildings, structures, piping, utilities, and other work executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper precaution to verify figures before laying out the Work, and will be held responsible for any error resulting from its failure to exercise such precaution.

H. See Specifications for additional requirements concerning layout of the Work.

1.04 PROGRESS MEETINGS

A. Progress meetings will be held throughout progress of the Work at intervals agreed to by OWNER, ENGINEER, and CONTRACTOR.

B. CONTRACTOR's project manager or approinted representative shall attend as appropriate to address agenda topics for each meeting. CONTRACTOR's representatives shall have authority to bind CONTRACTOR to decisions at the meetings.

C. The project schedule shall be updated monthly and shall be reviewed at each progress meeting. CONTRACTOR shall provide the following information in written form at each meeting.
   1. Construction progress, including:
      a. Activities completed this reporting period.
      b. Activities in progress this reporting period.
      c. Activities scheduled to commence this reporting period.
   2. Description of problem areas.
   3. Current and anticipated delays.
      a. Cause of the delay.
      b. Corrective action and schedule adjustments to correct the delay.
      c. Impact of the delay on other activities, on milestones, and on completion dates.
   4. Changes in construction sequence.

D. ENGINEER will prepare and distribute minutes to all attending parties.

END OF SECTION 01-039

SECTION 01 045

CUTTING, PATCHING, AND ALTERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for all cutting, fitting, patching, and other alterations required to complete the Work as specified herein or to:
   1. Make its several parts fit together properly.
   2. Uncover portions of the Work to install improperly sequenced Work.
   3. Remove and replace defective Work.
   4. Remove and replace Work not conforming to requirements of the Contract Documents.
   5. Provide penetrations of surfaces for installation of piping and electrical conduit.

1.02 REFERENCES

A. ANSI A10 Safety Requirements for Construction and Demolition.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall perform all cutting, patching, and alterations in strict accordance with pertinent requirements of these Specifications.

B. Except as modified by governing codes, CONTRACTOR shall comply with the applicable provision and recommendations of ANSI A10.

1.04 SUBMITTALS

A. CONTRACTOR shall submit a written request to OWNER well in advance of executing any cutting or alteration which affects the following:
   1. Work of OWNER or any separate contractor.
   2. Structural value or integrity of any element of the Project.
   3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
   4. Efficiency, operational life, maintenance, or safety of operational elements.
   5. Visual qualities of sight-exposed elements.

B. The request shall include:
   1. Description of affected work.
   2. The necessity for cutting, patching, or alteration.
   3. Effect on work of OWNER or any separate contractor, or on the structural or weather-proof integrity of the Project.
   4. Description of proposed work to include:
      a. Scope of cutting, patching, or alteration.
      b. Trades who will execute the work.
      c. Products proposed to be used.
      d. Extent of refinishing to be done.
   5. Alternatives to cutting and patching.
   6. Written permission of any separate contractor whose work will be affected.

C. Submit written notice to OWNER designating the date and the time the Work will be uncovered or executed.

1.05 SCHEDULING AND COORDINATION

A. All work under this section shall be coordinated with OWNER's work forces and those of other contractors and shall be accomplished at times acceptable to OWNER.

B. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the existing building structure, notify ENGINEER and OWNER 72 hours in advance and obtain OWNER's approval before proceeding with this phase of the work. Temporary facilities, if required, shall be in place prior to disruption of service.

PART 2–PRODUCTS

2.01 NEW MATERIALS

A. For replacement of work removed, CONTRACTOR shall use materials which comply with the pertinent sections of these Specifications.

B. All new materials for patching and extending work shall match existing products and work.

C. CONTRACTOR shall determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as the standard.

2.02 SALVAGEABLE MATERIAL

A. Materials or items designated to be reinstalled or to become the property of OWNER shall be as specified or as shown on the Drawings.

B. CONTRACTOR shall remove such items with care under the supervision of the trade responsible for reinstallation.

C. CONTRACTOR shall store these materials (off-site if necessary) and protect from damage until they are incorporated into the new work.

D. Items which are not to be reinstalled but are to become the property of OWNER shall be removed by CONTRACTOR with care, cleaned, and stored in a location at the Site to be approved by OWNER.

E. Materials or items damaged in its removal shall be replaced by CONTRACTOR with similar new material at no additional cost to OWNER.

F. Where existing equipment are indicated to be reused, CONTRACTOR shall repair such equipment and refinish as specified elsewhere.

2.03 UNSALVAGEABLE MATERIALS

A. Materials or items demolished and not designated to become the property of OWNER or not designated to be reinstalled shall become the property of CONTRACTOR and shall be removed from the site and legally and properly disposed of by CONTRACTOR.

B. Materials shall be removed by CONTRACTOR in a manner that will avoid damage to materials or equipment to remain.

PART 3–EXECUTION

3.01 INSPECTION

A. CONTRACTOR shall inspect existing conditions including elements subject to movement or damage during cutting, patching, and other alterations.

B. After uncovering the work, CONTRACTOR shall inspect conditions affecting installation of new products or performance of new work.

C. CONTRACTOR shall report unsatisfactory or questionable conditions to ENGINEER in writing.

D. CONTRACTOR shall not proceed with work until unsatisfactory or questionable conditions are resolved.

E. Beginning of cutting, patching, and alterations work means acceptance of existing conditions by CONTRACTOR.

3.02 PREPARATION AND PROTECTION

A. CONTRACTOR shall provide temporary bracing, shoring, needling, and support of the structure during alterations work as necessary to prevent collapse, settling, or deflection and to protect persons and property from injury or damage.

B. Temporary supports must adequately carry all existing and imposed load.

C. CONTRACTOR shall provide and maintain temporary protection of surface finishes, equipment, and adjacent work designated to remain where demolition, removal, and new work is being done, connections are being made, materials are being handled, or equipment is being removed.

D. CONTRACTOR shall provide temporary partitions or barriers to contain all dust, dirt and debris from entering into finished areas.

E. CONTRACTOR shall provide adequate fire protection in accordance with local Fire Department requirements.

F. CONTRACTOR shall provide waterproofing, weather protection, heat, and other facilities for that portion of the work which may be exposed by cutting and patching, demolition, or other alterations.

G. CONTRACTOR shall cut, move, or remove items as necessary for access to alterations and renovations work and replace and restore at completion of work.

H. CONTRACTOR shall prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.

I. CONTRACTOR shall be responsible for any damage to the existing structure or its contents directly or indirectly by its crews or those of its subcontractors.

3.03 PERFORMANCE

A. CONTRACTOR shall accomplish all work of cutting, removal, demolition, patching or other alterations using only persons skilled in the appropriate trade.

B. CONTRACTOR shall execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.

C. CONTRACTOR shall execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

D. CONTRACTOR shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

E. CONTRACTOR shall fit work airtight to pipes, sleeves, conduit, and other penetrations through surfaces.

F. CONTRACTOR shall thoroughly clean and prepare all surfaces to receive new finish or covering to completely remove all dirt, dust, grease, oil, paint, loose materials, and soil.

G. CONTRACTOR shall refinish entire surface as necessary to provide an even finish to match adjacent finishes:
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish entire unit.

3.04 DEMOLITION, CUTTING, AND REMOVAL

A. Cutting and removal of construction shall be performed by CONTRACTOR so as not to cut or remove more than is necessary and so as not to damage adjacent work.

B. CONTRACTOR shall cut out embedded anchorages and attachment items as required to properly provide for patching and repair of the respective finishes.

C. CONTRACTOR shall not cut structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.

D. CONTRACTOR shall not cut operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.

E. CONTRACTOR shall not cut work exposed to view (exterior or interior) in a manner resulting in noticeable reduction of visual qualities as determined by OWNER.

F. Construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of careless cutting or demolition and is unsuitable for use intended shall be removed and replaced at no additional cost to OWNER.

G. CONTRACTOR shall clean demolished areas and remove debris, waste, and rubbish from the building at the conclusion of each day's work.

H. CONTRACTOR shall not let piled waste material endanger the structure.

3.05 PATCHING, EXTENDING, AND MATCHING

A. Patching work shall conform to the standards of the Specifications where applicable and where not specified, work shall conform to the highest standards of the applicable trade.

B. CONTRACTOR shall patch construction to match adjacent work unless noted otherwise.

C. Patching or restoration shall be carried to natural breaks (e.g., corners) wherever possible.

D. CONTRACTOR shall provide adequate support to substrate for patching finishes.

E. Transitions: CONTRACTOR shall restore existing work that is damaged during patching operations to a condition equal to its construction at the time of the start of work.

3.06 UNANTICIPATED MECHANICAL AND ELECTRICAL WORK EXPOSED

A. Where unanticipated mechanical piping or electrical conduit is exposed during removal of partitions or walls, removal or rerouting shall be accomplished by CONTRACTOR as applicable.
   1. Rerouted piping shall be located and shall be connected to maintain all functions in proper operations.
   2. Abandoned piping may be left in place where it is buried in floors or walls, providing that it is completely disconnected from its source.
   3. There shall be no "dead end" gas, water, sewer, or vent piping existing in the completed work.
   4. Unless otherwise shown, abandoned piping, ductwork, conduit, or other mechanical or electrical items in chases, vertical enclosures, or concealed above ceilings shall be completely removed.

B. Removals, capping, or otherwise terminating services which are abandoned shall be accomplished without additional cost to OWNER.

END OF SECTION 01-045

SECTION 01060

REGULATORY REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. OSHA Requirements.
   2. Roadway Limits.
   3. Permits.
   4. Wage Rates.

1.02 OSHA REQUIREMENTS

A. All work including site safety, equipment, materials, and fabricated items provided under the Contract shall comply with the provisions of the "Occupational Safety and Health Act" (OSHA), the Kentucky Occupational Safety and Health Act (KYOSH), the East Logan Water District and all other applicable federal, state, county and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed.

B. The CONTRACTOR's failure to thoroughly familiarize itself with the aforementioned safety provisions shall not relieve CONTRACTOR from compliance with the obligations and penalties set forth therein.

1.03 ROADWAY LIMITS

A. CONTRACTOR shall comply with roadway weight restrictions including seasonal weight restrictions.

1.04 PERMITS

A. No permits were obtained by OWNER for this Project. CONTRACTOR shall obtain permits required for the Work and comply with the requirements therein. Where the requirements of any permit are more restrictive than the Drawings or the Specifications, the permit requirements shall govern.

1.05 WAGE RATES

A. Federal and State Prevailing Wage Rates are not applicable to this project.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-060

SECTION 01 090

REFERENCE STANDARDS AND DEFINITIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Reference Standards:
      a. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
      b. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is CONTRACTOR's responsibility to provide materials and workmanship which meet or exceed that specifically named code or standard.
      c. It is also CONTRACTOR's responsibility, when so required by the Contract Documents, to deliver to ENGINEER all required proof that the material or workmanship, or both, meet or exceed the requirements of the specifically named code or standard.
   2. Definitions:
      a. A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.
      b. Certain terms used in the Contract Documents are defined generally in this section to supplement definitions of the Agreement, General Conditions, Supplementary Conditions, and other general contract documents.
      c. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work.

B. Related Work Described Elsewhere: The specific naming of codes or standards occurs on the Drawings and in other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Familiarity with Pertinent Codes and Standards:
   1. It is CONTRACTOR's responsibility to verify the requirements of the specifically named codes and standards and to verify that the items procured for use in this Work meet or exceed the specified requirements.
   2. When required by individual sections of these specifications, CONTRACTOR shall obtain a copy of each pertinent code or standard and maintain the copies at the job site during submittals, planning, and progress of the Work until Substantial Completion of the Work is attained.

B. Overlapping or Conflicting Requirements:
   1. Where compliance with two or more industry standards or sets of requirements are specified, and the overlapping of those standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless more detailed language written directly into Contract Documents clearly indicates that a less stringent requirement is acceptable.
   2. Refer all uncertainties to ENGINEER for decision before proceeding.

1.03 REFERENCE STANDARDS

A. Applicable standards of the construction industry are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith. See Article 3.02 of the General Conditions for additional provisions regarding references.

B. Standards referenced directly in the Contract Documents or by governing regulation, have precedence over nonreferenced standards which are recognized in industry for applicability to the Work.

C. Nonreference standards are hereby defined to have no particular applicability to the work except as a general measurement of whether the Work complies with standards recognized in the construction industry.

D. Reference standards and codes listed in these specifications may include, but are not necessarily limited to, standards or codes published by the following agencies and organizations:

1. AA — Aluminum Association
   1525 Wilson Boulevard, Arlington, VA 22209

2. AAMA — American Architectural Manufacturer's Association
   1827 Walden Office Square Suite 550, Schaumberg, IL 60173-4268

3. AASHTO — American Association of State Highway & Transportation Officials
   444 North Capitol Street NW Suite 249, Washington, DC 20001

4. ACI — American Concrete Institute
   38800 Country Club Drive, Farmington Hills, MI 48331-3439

5. AI — Asphalt Institute
   2696 Research Park Drive, Lexington, KY 40511-8480

6. AISC — American Institute of Steel Construction
   One East Wacker Drive Suite 700, Chicago, IL 60601-1802

7. AISI — American Iron and Steel Institute
   25 Massachusetts Avenue NW Suite 800, Washington, DC 20001

8. ANSI — American National Standards Institute
   25 West 43rd Street, New York, NY 10036

9. APA — American Plywood Association
   7011 South 19th, Tacoma, WA 98466-5333

10. API — American Petroleum Institute
    1220 L Street NW, Washington, DC 20005-4070

11. ARI — Air-Conditioning & Refrigeration Institute
    4100 North Fairfax Drive Suite 200, Arlington, VA 22203

12. ASHRAE — American Society of Heating, Refrigerating, and Air Conditioning Engineers
    1791 Tullie Circle NE, Atlanta, GA 30329

13. ASME — American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

14. ASSE — American Society of Sanitary Engineering
901 Canterbury Suite A, Westlake, OH 44145

15. ASTM — ASTM International
100 Barr Harbor Drive, West Conshohoken, PA 19428-2959

16. AWI — Architectural Woodwork Institute
46179 Westlake Drive Suite 120, Potomac Falls, VA 20165-5874

17. AWPA — American Wood Protection Association
P.O. Box 361784, Birmingham, AL 35236-1784

18. AWS — American Welding Society
8669 Doral Boulevard Suite 130, Doral, FL 33166

19. AWWA — American Water Works Association
6666 West Quincy Avenue, Denver, CO 80235

20. BHMA — Builder's Hardware Manufacturers Association
355 Lexington Avenue 15th floor, New York, NY 10017

21. BIA — Brick Industry Association
1850 Centennial Park Drive Suite 301, Reston, VA 20191

22. CRSI — Concrete Reinforcing Steel Institute
9333 North Plum Grove Road, Schaumburg, IL 60173

23. EJMA — Expansion Joint Manufacturers Association
25 North Broadway, Tarrytown, NY 10591

24. FM — FM Global
FM Global Corporate Offices, 270 Central Avenue, Johnston, RI 02919

25. FTI — Facing Tile Institute
Box 8880, Canton, OH 44711

26. GA — Gypsum Association
6525 Belcrest Road Suite 480, Hyattsville, MD 20782

27. GANA — Glass Association of North America
800 SW Jackson Street Suite 1500, Topeka, KS 66612-1200

28. ICC — International Code Council
500 New Jersey Avenue NW 6th Floor, Washington, DC 20001

29. IES — Illuminating Engineering Society
120 Wall Street, Floor 17, New York, NY 10005-4001

30. MIL — Military Specifications
Naval Publications and Forms Center
5801 Tabor Avenue, Philadelphia, PA 19120

31. NAAMM — National Association of Architectural Metal Manufacturers
800 Roosevelt Road Building C Suite 312, Glen Ellyn, IL 60137

32. NCMA — National Concrete Masonry Association
13750 Sunrise Valley Drive, Herndon, VA 20171-4662

33. NECA — NECA
National Electrical Contractors Association
3 Bethesda Metro Center Suite 1100, Bethesda, MD 20814

34. NEMA — National Electrical Manufacturers Association
1300 North 17th Street Suite 1752, Rosslyn, VA 22209

35. NFPA — National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471

36. NIST — National Institute of Standards and Technology
(U.S. Department of Commerce), 100 Bureau Drive, Stop 1070
Gaithersburg, MD 20899-1070

37. NRCA — National Roofing Contractors Association
10255 West Higgins Road Suite 600, Rosemont, IL 60018-5607

38. NSF — National Sanitation Foundation International
P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48113-0140

39. OSHA — Occupational Safety & Health Administration
200 Constitution Avenue NW, Washington, DC 20210

40. PCA — Portland Cement Association
5420 Old Orchard Road, Skokie, IL 60077

41. PCI — Prestressed Concrete Institute
200 West Adams Street Suite 2100, Chicago, IL 60606

42. SAE — Society of Automotive Engineers
SAE World Headquarters
400 Commonwealth Drive, Warrendale, PA 15096-0001

43. SDI — Steel Deck Institute
P.O. Box 25, Fox River Grove, IL 60021

44. SDI — Steel Door Institute
30200 Detroit Road, Westlake, OH 44145-1987

45. SIGMA — Sealed Insulating Glass Manufacturers Assoc.
401 North Michigan Avenue Suite 2400, Chicago, IL 60611

46.	SJI	Steel Joist Institute 234 Cheves Street, Florence, SC 29501
47.	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 4201 Lafayette Center Drive, Chantilly, VA 20151-1219
48.	SSPC	Society for Protective Coatings 40 24th Street 6th Floor, Pittsburgh, PA 15222-4656
49.	TCA	Tile Council of America 100 Clemson Research Boulevard, Anderson, SC 29625
50.	ICC	International Code Council 500 New Jersey Avenue NW 6th Floor, Washington, DC 20001
51.	UL	Underwriters Laboratories 333 Pfingston Road; Northbrook, IL 60062

1.04 SUBMITTALS

A. For OWNER's records, CONTRACTOR shall submit copies of permits, licenses, certifications, inspection reports, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

1.05 DEFINITIONS

A. Indicated:
   1. The term "indicated" is a cross-reference to details, notes, or schedules on the drawings, to other paragraphs or schedules in the specifications and to similar means of recording requirements in the Contract Documents.
   2. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate cross-reference, and no limitation is intended except as specifically noted.

B. Approve (or Words of Similar Nature):
   1. Where used in conjunction with ENGINEER's response to submittals, requests, applications, inquiries, reports, and claims by CONTRACTOR, the meaning of the term "approve" will be held to the limitation of ENGINEER's responsibilities and duties as specified in Paragraph 1.02.B.1. of the General Conditions.
   2. In no case will "approval" by ENGINEER be interpreted as a release of CONTRACTOR from responsibility to fulfill requirements of the Contract Documents.

C. Minimum Requirements:
   1. Indicated requirements are for a specific minimum acceptable level of quality or quantity, as recognized in the industry.
   2. Actual work must comply with (or within specified tolerances) or exceed minimums.
   3. CONTRACTOR shall refer uncertainties to ENGINEER before proceeding.

D. Abbreviations: Abbreviations, where not defined in the Contract Documents, will be interpreted to mean the normal construction industry terminology.

END OF SECTION 01-090

SECTION 01 300

SUBMITTALS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
   2. To facilitate CONTRACTOR's understanding of the design intent, procedures have been established for advance submittal of design data and for its review or rejection by ENGINEER.
   3. The type of submittal requirements specified in this section include progress schedule, shop drawings, product data, samples, and other miscellaneous work related submittals.

B. Related work described elsewhere: More detailed requirements for submittals are described in other sections of these specifications for some materials and equipment. They are to be considered additional requirements to supplement the requirements specified in this section. Submittals shall conform to Article 6 of the General Conditions.

C. Definitions: "Electronic Submittal" is defined as any submittal transmitted electronically to ENGINEER for review.

1.02 IDENTIFICATION OF SUBMITTALS

A. CONTRACTOR shall completely identify each submittal and resubmittal by showing at least the following information:
   1. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
   2. Name and location of project and identification number.
   3. Drawing number and specifications section number to which the submittal applies.
   4. Include the date of each submittal or resubmittal.

1.03 GROUPING OF SUBMITTALS

A. Unless otherwise specifically permitted by ENGINEER, CONTRACTOR shall make all submittals in groups containing all associated items so that information is available for checking each item when it is received.

B. Partial submittals may be rejected as not complying with the provisions of the Contract Documents.

1.04 TIMING OF SUBMITTALS

A. CONTRACTOR shall make all submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary approval, for possible revision and resubmittal, and for placing orders and securing delivery.

B. The review period for submittals that are received after 3 P.M. shall commence on the following business day.

1.05 CONSTRUCTION PROGRESS SCHEDULE

A. Submit initial schedule in duplicate within 10 days after date of OWNER-CONTRACTOR Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.06 SHOP DRAWINGS

A. Shop drawings shall include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects. Shop drawings shall be submitted for all manufactured or fabricated items. See individual technical sections for special requirements.

B. CONTRACTOR shall make all shop drawings accurately to scale and sufficiently large to show all pertinent aspects of the item and its method of connection to the work.

C. Shop drawings shall be checked, approved, and stamped by CONTRACTOR in accordance with the General Conditions before transmittal to ENGINEER for review and approval.

D. Complete shop drawings and descriptive data shall be submitted on all manufactured or fabricated items prior to 25% completion of the Work. Applications for payment beyond 25% of the Contract amount will not be recommended for payment until all shop drawings are submitted or a revised schedule for any remaining submittals is agreed to by OWNER and ENGINEER.

E. CONTRACTOR shall submit shop drawings following the electronic submittal procedure described below. If electronic submittal is impossible, CONTRACTOR may request ENGINEER to review hard copy submittals on a limited basis. ENGINEER may request to review hard copy submittals on a limited basis for submittals that are over 100 pages in length. If ENGINEER agrees to or requests hard copy submittal review, CONTRACTOR shall submit six color copies of shop drawings and descriptive data to ENGINEER for approval. Three copies of these will be returned to CONTRACTOR if approved. If shop drawings are not approved or if they are stamped "Approved as Noted-Resubmit," two corrected copies will be returned to CONTRACTOR for use in resubmittal. If CONTRACTOR desires more than three approved copies, submitted quantity shall be increased accordingly.

F. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.

G. Shop drawings submitted to ENGINEER will be reviewed and stamped "Approved," "Approved as Noted," "Approved as Noted-Resubmit," or "Not Approved." CONTRACTOR shall resubmit the above number of corrected shop drawings for all shop drawings stamped "Approved as Noted-Resubmit" and "Not Approved" and will continue this process until shop drawings are stamped "Approved" or "Approved as Noted." If drawings are stamped "Approved as Noted-Resubmit," fabrication may proceed in accordance with the marked-up shop drawings. Installation shall not proceed until shop drawings have been resubmitted and stamped "Approved" or "Approved as Noted."

H. If shop drawings are stamped "Approved as Noted" or "Approved as Noted-Resubmit" and CONTRACTOR does not agree with revisions or cannot conform with revisions, fabrication shall not proceed and shop drawings shall be resubmitted with explanation of CONTRACTOR's position.

I. All shop drawings used for construction site activities shall bear the "Approved" or "Approved as Noted" stamp of ENGINEER.

J. Arrangements may be made between CONTRACTOR and ENGINEER to provide additional copies of "Approved" shop drawings for field activity purposes.

K. Electronic Submittal Procedures:

1. Summary:
   a. Shop drawing and product data submittals shall be transmitted to ENGINEER in electronic (PDF) format by email.
   b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
   c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
2. Procedures:
   a. Submittal Preparation–CONTRACTOR may use any or all of the following options:
      (1) Subcontractors and Suppliers provide electronic (PDF) submittals to CONTRACTOR.
      (2) Subcontractors and Suppliers provide paper submittals to CONTRACTOR who electronically scans and converts to PDF format.
      (3) Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format.
   b. CONTRACTOR shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.
   c. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of CONTRACTOR.
   d. Electronically submitted shop drawings shall follow the following format:
      (1) Filenames for the shop drawing submittals shall follow a XXXXX.YYY-Z. Description convention where XXXXX is the specification section number, YYY is the submittal number, .Z is the resubmittal number, and description is a short description of what the submittal includes. Submittals shall be consecutively numbered in direct sequence of submittal. Resubmittals shall be consecutively numbered with the first submittal numbered with an -0 and the first resubmittal numbered with a -1.
         (a) Example file name: 03200.016-1. Structure 10 Concrete Reinforcement. This would be the first revision of the sixteenth submittal and contain information on concrete reinforcement.
      (2) All files shall be delivered in PDF format with a minimum resolution of 300 dpi unless otherwise requested by ENGINEER. Scanned in material shall be scanned in color and any markings by CONTRACTOR shall be made in red. Pages shall be rotated to the appropriate position for easy reading on a computer monitor such that the majority of text is vertical.
      (3) Files shall be delivered without security features activated.
      (4) Shop Drawings shall be uploaded as individual files. Files combined into a zip drive are not acceptable. All pages of one submittal should be contained in one file.
      (5) The file shall open to a cover page containing, at a minimum, the following information:
         (a) CONTRACTOR's stamp.
         (b) Name, e-mail, and telephone number of the individual who may be contacted for further information.
         (c) Project number.
         (d) Submittal number.
         (e) Submission date, if resubmittal, all previous submission dates.
         (f) Index detailing contents and the total number of pages in the submittal.

e. Once a shop drawing has been "Approved" or "Approved as Noted," CONTRACTOR shall provide three hard color copies of the "Approved" or "Approved as Noted," shop drawings to ENGINEER. CONTRACTOR is responsible for the hard copy color replication of ENGINEER's "Approved" or "Approved as Noted," shop drawings for use by CONTRACTOR. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.

L. CONTRACTOR is fully responsible for obtaining any and all copyright permission associated with conversion of shop drawing information to electronic format.

M. Shop drawings shall include verification that the item meets applicable codes and standards such as NFPA 30, ASTM, OSHA, and others.

1.07 COLORS AND PATTERNS

A. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, CONTRACTOR shall submit accurate color charts and pattern charts to ENGINEER for OWNER's review and selection.

B. Unless all available colors and patterns have identical wearing capabilities and are identically suited for the installation, CONTRACTOR shall completely describe the relative capabilities of each.

1.08 SAMPLES AND FIELD MOCKUPS

A. CONTRACTOR shall provide samples and field mockups where noted or specified.

B. Samples are physical examples which illustrate materials, equipment, or workmanship and establish standards by which the work will be judged.

C. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product and full range of color, texture, and pattern.

D. Samples shall have labels firmly attached, bearing the following information:
1. Name of project.
2. Description of product and finish.
3. Name of CONTRACTOR.
4. Trade name and number of product.
5. Standards met by the product.

E. Approval of samples must be obtained prior to proceeding with any work affected by material requiring sample approval.

F. Samples, unless otherwise noted, become the property of OWNER.

G. In situations specifically approved by ENGINEER, the retained sample may be used in the construction as one of the installed items.

H. Field Mockups:
1. CONTRACTOR shall erect field mockups at the project site in a location acceptable to ENGINEER and OWNER.
2. When accepted by ENGINEER, the mockup will become the basis for comparison of the actual work.
3. Remove mockup at conclusion of the work if it was not incorporated into the work.

1.09 PRODUCT DATA

A. CONTRACTOR shall provide product data as required to supplement shop drawings.

B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by CONTRACTOR to illustrate a material, product, or system for some portion of the work.

C. CONTRACTOR shall collect required product data into one submittal for each unit of work or system.

D. CONTRACTOR shall include manufacturer's standard printed recommendations for application and use, compliance with standards, performance characteristics, wiring and piping diagrams and controls, component parts, finishes, dimensions, required clearances, and other special coordination requirements.

E. CONTRACTOR shall mark each copy of standard printed data to identify pertinent products, models, options, and other data.

F. CONTRACTOR shall supplement manufacturer's standard data to provide information unique to the work.

1.10 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by ENGINEER.

B. Shop Drawings and Product Data:
   1. Revise initial drawings or data and resubmit as specified for initial submittal.
   2. Itemize in a cover letter any changes which have been made other than those requested by ENGINEER.

C. Electronic shop drawing resubmissions shall follow the nomenclature described in Section 1.06.K.2.f.

1.11 MANUFACTURER'S DIRECTIONS

A. Manufactured articles, materials, and equipment shall be stored, commissioned, operated, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless specified to the contrary.

B. Wherever specifications call for work to be performed or materials to be installed in accordance with the manufacturer's printed instructions or directions, CONTRACTOR shall furnish copies as required for shop drawings of those instructions or directions to ENGINEER before installing the material or performing the work.

1.12 MAINTENANCE MANUAL

A. Prior to 50% completion of the Contract or at a minimum of 45 days prior to the scheduled start-up date of any individual item of equipment, whichever is earlier, CONTRACTOR shall furnish to ENGINEER four complete copies of a maintenance manual for all equipment furnished and an electronic format compact disk of the maintenance manual in the most recent version of Adobe (.pdf) format identical to the hard copy. Applications for payment beyond 50% of the contract amount will not be recommended for payment until all maintenance manuals are submitted or a revised schedule for remaining maintenance manuals is agreed to by OWNER and ENGINEER.

B. CONTRACTOR is responsible for producing an electronic version of the Equipment Operations and Maintenance (O&M) Manuals Manual. The Electronic Equipment O&M Manual shall be delivered in Portable Document Format (PDF). The entire manual may be converted to PDF via scanning or other method of conversion. Drawings or other graphics must be converted to PDF format and made part of the PDF document. The CONTRACTOR shall provide all Equipment O&M Manuals in the electronic format as defined below.

C. The filename for the Equipment O&M Manual submittal will be provided with the request for final Equipment O&M Manuals. Filenames use the "eight dot three" convention (XXXXX_YY.PDF) where XXXXX is the specification section number and YY is an ID number. No one file shall be larger than 10 MB. If technical problems require that the submittal be divided into more than one file, a letter extension shall be added to the end of each filename.

D. (Example: 19876_01a.pdf). The number of files shall be kept to a minimum. Equipment O&M Manuals that span more than one file shall have the final Bookmark "Return to Table of Contents" which shall take the User to the first file on the Equipment O&M Manual.

E. All text (word processed), spreadsheets, and electronic graphics shall be delivered in portable document format (*.PDF). The resolution of all scanned images shall be a minimum of 300 dpi unless otherwise requested by ENGINEER. Scanned images shall be processed with the "original image with hidden text" option (Adobe Acrobat 6 or higher). This results in a clear image and provides for optical character recognition (OCR) and word search functionality. Graphical files shall be fully searchable. All submittals must be indexed with the Adobe Catalog feature. Placement and structure of index files shall be in accordance with Adobe's recommendations to minimize problems when transferring files. Successful searches for words or strings in the PDF document shall demonstrate proof of OCR.

F. Rotate pages viewed in landscape to the appropriate position for easy reading on a computer monitor.

G. Bookmarks shall be created in the navigation frame for each entry in the Table of Contents. Three levels deep is usually enough (i.e., "Chapter", "Section", "Subsection"); however, complex submittals like instrumentation and electrical may be required at the discretion of ENGINEER. When setting bookmarks for Chapter level heading, the page shall be displayed at Full Page. Section and Subsection level heading pages shall be displayed as a magnified view. Bookmarks shall be displayed as subordinate (to other bookmarks in their hierarchy set so that only the Chapter level headings are displayed.

H. Thumbnails shall be generated and embedded in each PDF file.

I. Files shall be delivered without Security features activated. Password protected files will be unacceptable.

J. The opening view for PDF files shall be set as follows:
   1. Initial View: Bookmarks and Page
   2. Magnification: Fit In Window
   3. Page Layout: Single Page

K. The file shall open to the cover page of the Equipment O&M Manual with bookmarks to the left. The first bookmark shall be the name of Equipment O&M Manual.

L. The submittal shall be delivered on CD after all Equipment O&M Manuals have been received and reviewed. Each CD shall be labeled, at a minimum, as follows, including: 1) CD-ROM disks, 2) jewel cases, and 3) hard copies.

M. Manufacturer name, point of contact, telephone number, facsimile number, and e-mail address as appropriate.

N. Equipment name and/or O&M title spelled out in complete words.

   Example "Operations and Maintenance Manual"
   "Horizontal Centrifugal Nonclog Pump"

O. Specifications section number.

P. Project name.

Q. Date and File Name: Example "12-20-07", "19876_01.pdf"

R. CONTRACTOR shall reprocess any portion of the document that does not view or print to OWNER's satisfaction.

S. CONTRACTOR is fully responsible for obtaining any and all copyright permissions associated with conversion of this information to electronic format.

T. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventive maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions, parts supplier location, trouble shooting and start-up procedures and, where applicable, test data and curves. All sheets shall have reduced dimensions as described for shop Drawings. All sheets shall be furnished in 3-ring binders or 3-tab report covers.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-300

SECTION 01 400

QUALITY CONTROL

PART 1–GENERAL

1.01 SUMMARY

A. Work Includes:
   1. Quality Assurance–Control of Installation.
   2. Tolerances.
   3. Manufacturers' Field Services and Reports.

1.02 QUALITY ASSURANCE–CONTROL OF INSTALLATION

A. CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. CONTRACTOR shall comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.

D. CONTRACTOR shall comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Work shall be performed by persons qualified to produce workmanship of specified quality.

F. CONTRACTOR shall secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

A. CONTRACTOR shall monitor tolerance control of installed products to produce acceptable work and shall not permit tolerances to accumulate.

B. CONTRACTOR shall comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from ENGINEER before proceeding.

C. CONTRACTOR shall adjust products to appropriate dimensions; position before securing products in place.

1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification sections or when requested by ENGINEER, CONTRACTOR shall require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, and quality of workmanship.

B. CONTRACTOR shall submit qualifications of observer to ENGINEER 30 days in advance of required observations.

C. CONTRACTOR shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. CONTRACTOR shall submit report in duplicate within 30 days of observation to ENGINEER for information.

END OF SECTION 01-400

SECTION 01-500

TEMPORARY FACILITIES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Temporary utilities.
   2. Temporary support facilities.
   3. Removal of temporary facilities.

B. CONTRACTOR shall arrange for and provide temporary facilities as required for proper and expeditious prosecution of the Work.

C. CONTRACTOR shall pay all costs, except as otherwise specified, until final acceptance of the Work unless OWNER makes arrangements for use of completed portions of the Work after substantial completion in accordance with the provisions of the General Conditions.

D. CONTRACTOR shall make all temporary connections to utilities and services in locations acceptable to OWNER and local authorities having appropriate jurisdiction.
   1. Furnish all necessary labor and materials.
   2. Make all installations in a manner subject to the acceptance of such authorities and OWNER.
   3. Maintain such connections.
   4. Remove temporary installation and connection when no longer required.
   5. Restore services and sources of supply to proper operating conditions.

1.02 TEMPORARY UTILITIES

A. Temporary Toilets: CONTRACTOR shall provide and maintain sanitary temporary chemical toilets located where approved by OWNER and in sufficient number required for the work force employed by CONTRACTOR.

B. Temporary Electrical Services:
   1. CONTRACTOR shall make all necessary arrangements, furnish, install, and maintain necessary temporary electrical services at the Sites. CONTRACTOR shall remove all temporary services when Project is complete.
   2. All utility charges for installation of the temporary services shall be paid for by CONTRACTOR. All metering installation charges and all energy charges for electric current used for temporary lighting and power are to be paid by CONTRACTOR.
   3. No permanent electrical equipment or wiring shall be used without express written permission of OWNER. Such approval, if given, shall not affect guarantee period. If OWNER authorizes use of permanent service facilities, CONTRACTOR shall pay all metering costs until acceptance or occupancy (whichever occurs first) of building by OWNER.

C. Weather Protection and Temporary Heat:
   1. CONTRACTOR shall provide weather protection to protect the Work from damage because of freezing, rain, snow, and other inclement weather.
   2. Existing tanks taken out of service as part of the Work shall be protected by CONTRACTOR from damage because of frost by insulating, enclosure, heating, or a combination of methods as required.
   3. No permanent heating equipment shall be used on a temporary basis.

D. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire

extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.

E. Temporary Water: CONTRACTOR shall supply its own water during construction. CONTRACTOR shall also provide its own piping, valves, and appurtenances for its requirements.

F. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.

G. Water for disinfection and testing of lines and tanks will be available one time from the East Logan Water District without charge. Water for any other purpose shall be paid for by CONTRACTOR.

1.03 TEMPORARY SUPPORT FACILITIES

A. CONTRACTOR shall provide whatever facilities and services which may be needed to properly support primary construction process and meet compliance requirements and governing regulations.

B. CONTRACTOR shall not use permanent facilities except as otherwise indicated, unless authorized by OWNER.

1.04 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary materials, equipment, services, and construction as soon as practicable but no later than just prior to final completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities and restore existing facilities used during construction to specified, or to original, condition.

C. Minor temporary facilities which interfere with OWNER's operations shall be removed at the end of each Work period.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-500

SECTION 01-560

TEMPORARY CONTROLS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Dust Control.
   2. Water, Erosion, and Sediment Control.
   3. Site Security.
   4. Daily Cleanup.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 DUST CONTROL

A. CONTRACTOR shall execute the Work by methods to minimize raising dust from construction operations.

B. CONTRACTOR shall provide positive means to prevent air-borne dust from dispersing into atmosphere.

3.02 WATER, EROSION, AND SEDIMENT CONTROL

A. CONTRACTOR shall grade site to drain and shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. CONTRACTOR shall protect Site from puddling or running water.

C. CONTRACTOR shall provide erosion control measures as necessary to control discharge of sediment laden water to surface waters and wetlands.

D. Except as provided for in the document, overland discharge of water from dewatering operations shall not be allowed. Depending on water quality, such water shall either be piped directly to the surface water or shall be directed to sedimentation basins or other such structures or features prior to discharge to surface waters so as not to cause damage to existing ground and improvements, erosion, or deposition in the discharge area.

E. CONTRACTOR shall use jute or synthetic netting, silt fences, straw bales, dikes, channels, and other applicable measures to prevent erosion of soils disturbed by its construction operation.

F. Restoration of the Site shall proceed concurrently with the construction operation. See Drawings and Specifications for erosion control measures in addition to that which may be required above.

G. Erosion control measures shall comply with the following document: Kentucky's Best Management Practices for Construction Activities.

3.03 SITE SECURITY

A. CONTRACTOR shall have the sole responsibility of safeguarding the Site perimeter to prevent unauthorized entry to the Site throughout the duration of the Project. CONTRACTOR shall at all times provide such permanent and temporary fencing or barricades or other measures as may be necessary to restrict unauthorized entry to its construction area including construction in public rights-of-way or easements. Site security measures shall include safeguards against attractive nuisance hazards as a result of construction activity.

B. CONTRACTOR shall at all times be responsible for the security of the Work including materials and equipment. OWNER will not take any responsibility for missing or damaged equipment, tools, or personal belongings. CONTRACTOR shall have the sole responsibility of safeguarding the Work and the Site throughout the duration of the Project.

3.04 DAILY CLEANUP

A. CONTRACTOR shall clean up the Site and remove all rubbish on a daily basis.

B. CONTRACTOR shall clean up public streets and highways and remove any dirt, mud or other materials due to project traffic on daily basis and shall comply with all local and state ordinances and permit requirements.

END OF SECTION 01-560

SECTION 01-590

FIELD OFFICES AND SHEDS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Materials, equipment, and furnishings.
   2. Construction.
   3. Environmental control.
   4. CONTRACTOR office and facilities.
   5. Storage areas and sheds.
   6. Preparation.
   7. Installation.
   8. Maintenance and cleaning.
   9. Removal.

PART 2–PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FURNISHINGS

A. Materials, equipment and furnishings shall be serviceable, new or used, and adequate for required purpose.

2.02 CONSTRUCTION

A. Portable or mobile buildings, or buildings shall be constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. CONTRACTOR shall provide structurally sound, secure, weathertight enclosures for office and storage spaces.

C. Temperature transmission resistance of floors, walls, and ceilings shall be compatible with occupancy and storage requirements.

D. Exterior materials shall be weather resistant.

E. Interior materials in offices shall consist of sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

F. Lighting for offices shall be 50-foot candles minimum at desk top height, with exterior lighting at entrance doors.

G. Provide appropriate type fire extinguisher at each office and each storage area.

H. Interior materials in storage sheds shall be as required to provide specified conditions for storage of products.

2.03 ENVIRONMENTAL CONTROL

A. Heating, cooling, and ventilating for offices shall consist of automatic equipment to maintain comfort conditions; 70°F heating and 78°F cooling.

B. Heating and ventilation for storage spaces shall be as needed to maintain products in accordance with Contract Documents and to provide adequate lighting for maintenance and observation of products.

2.04 CONTRACTOR OFFICE AND FACILITIES

A. CONTRACTOR shall provide facilities to meet CONTRACTOR's needs.

2.05 STORAGE AREAS AND SHEDS

A. Provide storage areas and sheds of size to meet storage requirements for products of individual sections, allowing for access and orderly provision for maintenance and for observation of products.

PART 3–EXECUTION

3.01 PREPARATION

A. CONTRACTOR shall fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

A. CONTRACTOR shall install office spaces ready for occupancy as justified by the CONTRACTOR'S needs or as agreed upon by ENGINEER.

3.03 MAINTENANCE AND CLEANING

A. CONTRACTOR shall maintain approach walks free of mud, water, and snow.

3.04 REMOVAL

A. Upon final acceptance and completion of the Work, CONTRACTOR shall remove field offices, foundations, utility services, and debris, and shall restore areas.

END OF SECTION 01-590

SECTION 01-600

MATERIALS AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for the delivery, handling, storage and protection of all material and equipment required to complete the Work as specified herein.

B. Related Sections and Divisions: Specific requirements for the handling and storage of material and equipment are described in other sections of these Specifications.

1.02 PRODUCTS

A. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

B. CONTRACTOR shall not use materials and equipment removed from existing construction, except as specifically required, or allowed, by the Contract Documents.

C. When any construction deviations from the Drawings and/or Specifications necessary to accommodate equipment supplied by CONTRACTOR, result in additional costs to CONTRACTOR or other contractors, such additional costs shall be borne by CONTRACTOR. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

D. Each major component of equipment shall bear a nameplate giving the name and address of the manufacturer and the catalogue number or designation.

1.03 TRANSPORTATION AND HANDLING

A. Materials, products and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.

B. CONTRACTOR shall not overload any portion of the structure in the transporting or storage of materials.

C. CONTRACTOR shall not damage other construction by careless transportation, handling, spillage, staining or impact of materials.

D. CONTRACTOR shall provide equipment and personnel to handle products, including those provided by OWNER, by methods to prevent soiling and damage.

E. CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

F. CONTRACTOR shall handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designated lift points.

1.04 DELIVERY AND RECEIVING

A. CONTRACTOR shall arrange deliveries of products in accordance with the Progress Schedule, allowing time for observation prior to installation.

B. CONTRACTOR shall coordinate deliveries to avoid conflict with the Work and conditions at the Site; limitations on storage space; availability of personnel and handling equipment and OWNER's use of premises.

C. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.

D. CONTRACTOR shall clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.

E. Immediately on delivery, CONTRACTOR shall inspect shipment to assure:
   1. Product complies with requirements of Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Accessories and installation hardware are correct.
   4. Containers and packages are intact and labels legible.
   5. Products are protected and undamaged.

1.05 STORAGE AND PROTECTION

A. General:
   1. CONTRACTOR shall store products, immediately on delivery, in accordance with manufacturer's instructions, with all seals and labels intact and legible.
   2. Available storage space at the Site is limited. Any additional off-site space required shall be arranged by CONTRACTOR.
   3. CONTRACTOR shall allocate the available storage areas and coordinate their use by the trades on the job.
   4. CONTRACTOR shall arrange storage in a manner to provide access for maintenance of stored items and for observation.

B. In enclosed storage, CONTRACTOR shall:
   1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.
   2. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
   3. Provide ventilation for sensitive products as required by manufacturer's instructions.
   4. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
   5. Store solid materials such as insulation, tile, mechanical and electrical equipment, fittings, and fixtures under shelter, in original packages, away from dampness and other hazards.
   6. Store liquid materials away from fire or intense heat and protect from freezing.

C. At exterior storage, CONTRACTOR shall:
   1. Store unit materials such as concrete block, brick, steel, pipe, conduit, door frames, and lumber off ground, out of reach of dirt, water, mud and splashing.
   2. Store tools or equipment that carry dirt outside.
   3. Store large equipment so as not to damage the Work or present a fire hazard.
   4. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet material and provide ventilation to avoid condensation.
   5. Completely cover and protect any equipment or material which is prime coated or finish painted with secured plastic or cloth tarps. Store out of reach of dirt, water, mud and splashing.
   6. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
   7. Provide surface drainage to prevent erosion and ponding of water.
   8. Prevent mixing of refuse or chemically injurious materials or liquids.
   9. Cover aggregates such as sand and gravel in cold wet weather.
   10. Remove all traces of piled bulk materials at completion of work and return site to original or indicated condition.

1.06 MAINTENANCE OF STORAGE

A. CONTRACTOR shall periodically inspect stored products on a scheduled basis.

B. CONTRACTOR shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.

C. CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

D. CONTRACTOR shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to ENGINEER when the equipment is installed.

1.07 INSTALLATION REQUIREMENTS

A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.

B. After installation, CONTRACTOR shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.

C. CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the Work by OWNER. Damaged material and equipment shall be immediately removed from the Site.

1.08 CONCRETE EQUIPMENT BASE

A. Cast-in-place concrete equipment bases shall be provided for all new and relocated equipment including electrical control panels, motor control centers, switchgear, etc. Concrete equipment bases shall be provided by CONTRACTOR except where specifically noted to be provided by others. Bases shall be 3-1/2 inch minimum height and shall be a minimum of 3 inches larger than equipment being supported. Grouting of equipment bases shall be as recommended by equipment manufacturer.

B. Concrete and grout shall meet applicable sections of the specifications.

C. Provide all anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete for support of equipment.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-600

SECTION 01-650

STARTING OF SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Starting equipment and systems.
   2. Demonstration and instructions.
   3. Start-up and testing.

B. CONTRACTOR shall perform the Work described in the following subsections.

1.02 STARTING EQUIPMENT AND SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify ENGINEER and OWNER a minimum of seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturers' instructions.

G. Require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report.

I. Provide lubricants as recommended by manufacturer appropriate for start-up conditions.

1.03 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to OWNER's personnel.

B. For equipment or systems requiring seasonal operation, perform demonstration for noncurrent season at start of noncurrent season.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER's personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. Supervision and Start-up: Installation of all equipment furnished under this Contract shall be supervised as required by a qualified representative of equipment manufacturer. All equipment shall be placed in operation by a qualified representative of the equipment manufacturer and the staff shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to OWNER's satisfaction.

G. Where items of equipment are placed into service at different times or sequence, manufacturer's services for start-up, field testing, and supervision shall be provided for each time or sequence. Training shall be provided prior to or at the time the first similar item of equipment is placed in service.

1.04 START-UP AND TESTING

A. Prior to acceptance of any portion of the Work, start-up and testing of all equipment and testing of all materials furnished on the Project by CONTRACTOR shall have been conducted in the presence of representatives of CONTRACTOR, OWNER and ENGINEER and also manufacturer if requested by OWNER or ENGINEER.

B. CONTRACTOR shall provide whatever temporary installations and conditions are necessary in order to perform start-up and testing operations on all equipment and materials furnished under the Contract. Temporary connections and equipment necessary during start-up and testing operations shall include, but not be limited to, temporary piping and electrical equipment and devices, temporary connection from various parts of the systems and any other labor, materials, fuel, devices or items that may be required for start-up and testing operations. Temporary conditions shall include filling with water, if necessary, to check equipment and materials.

C. All temporary installations and conditions shall be removed by CONTRACTOR upon completion of start-up and testing.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-650

SECTION 01-700

CONTRACT CLOSEOUT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Closeout procedures.
   2. Final cleaning.
   3. Adjusting.
   4. Project record documents.
   5. Warranties.
   6. Spare parts and maintenance materials.

1.02 CLOSEOUT PROCEDURES

A. CONTRACTOR shall provide submittals to ENGINEER that are required by governing or other authorities.

B. CONTRACTOR shall comply with General Conditions and Supplementary Conditions and complete the following before requesting ENGINEER's observation of the Work, or designated portion thereof, for substantial completion.
   1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of Work, enabling OWNER's unrestricted occupancy and use.
   2. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
   3. Submit consent of surety (if surety required in Contract).
   4. Complete final cleaning, touch-up work of marred surfaces, and remove temporary facilities and tools.
   5. Disinfection testing results as indicated in Section 11200.
   6. Notarized release of liens from all subcontractors and equipment and material suppliers.

1.03 FINAL CLEANING

A. It is CONTRACTOR's responsibility to completely clean up the inside and outside of all buildings/structures and the construction site at the completion of the Work.

1.04 ADJUSTING

A. CONTRACTOR shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

A. CONTRACTOR shall maintain on Site, one set of the following record documents to record actual revisions to the Work:

   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. CONTRACTOR shall ensure entries are complete and accurate, enabling future reference by OWNER.

C. CONTRACTOR shall store record documents separate from documents used for construction.

D. CONTRACTOR shall record information concurrent with construction progress.

E. Specifications: CONTRACTOR shall legibly mark and record at each Product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by addenda and modifications.

F. Record Documents and Shop Drawings: CONTRACTOR shall legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.
   6. Disinfection testing results.

1.06 WARRANTIES

A. CONTRACTOR shall provide warranties beyond project one year warranty as required by technical sections and as follows.

B. Submit warranty information as follows:
   1. Provide notarized copies.
   2. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers, and provide Table of Contents and assemble in three ring binder with durable cover.
   3. Submit with request for certificate of Substantial Completion.
   4. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. CONTRACTOR shall provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections.

1.08 RELEASE OF LIENS

A. CONTRACTOR shall provide to the ENGINEEER notarized release of liens from all subcontractors, equipment and material suppliers, all before final payment on the project.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION 01-700

Section 02 100

WATER LINE GENERAL REQUIREMENTS

1.0 GENERAL

1.1 SCOPE OF WORK

The water lines and appurtenances required on this contract shall be furnished in full compliance with the contract specifications and contract drawings.

Work to be performed under the unit price items, described subsequently herein, shall include for each item all excavation (including rock excavation, if any) the removal of existing pavements, curb and gutter, sidewalks, driveways, brush and timber, structures and piping to be relocated or abandoned; also sheeting, diking, well pointing, bailing, dewatering; the furnishing, placing and removal of bulkheads, the restoration of any utilities, parkways, trees, shrubbery, culverts, fences and other items disturbed by construction operations; backfilling, removal and disposal of excess or waste excavated materials; and testing.

The cost of all such work and the cost of other work necessary for the complete water line installation shall be included in the unit price pay items provided.

1.2 STANDARDS

Where materials and methods are indicated in the Specifications as being in conformance with a standard specification (i.e. AWWA, ASTM, etc.) it shall refer in all cases to the latest edition of the specification or standard, and shall include all interim revisions. Listing of a standard specification without further reference shall indicate that the particular material or method shall conform to the referenced specification.

2.0 WORK INCIDENTAL TO CONSTRUCTION

Work to be performed under this heading includes all the work designated as "incidental to construction" and other work required by the plans, specifications or contract documents in order to fully complete the work on the project, but not provided with a specific pay item in the bid form or specifically set out or described in detail. The contractor shall perform such work, and the contractor shall include all charges for the work in the bid items provided. No claim for additional compensation based upon work that could be reasonably foreseen as being required to complete the project not being described in the contract documents will be considered.

2.1 PUBLIC AND PRIVATE UTILITIES

Where any utilities, such as water, sewer, telephone, power, oil or gas transmission, or any other, either public or private are encountered, the contractor shall provide adequate protection for them and will be held responsible for any damage to such utility from his operations. When it is apparent that construction operations may damage the integrity of any utility conduit or pole, or the support of any structure, the contractor shall notify the utility owner of this possibility and shall take such steps as may be required to provide temporary bracing or support of the affected conduit, pole or structure.

The cost of any bracing or support of conduits, poles or structures encountered in the work shall be included in the cost of water main construction.

When, in order to carry out the work, a pole, conduit or structure is required to be removed or relocated, the contractor shall be responsible for making all arrangements with the utility owner for such removal or relocation. All costs for such relocation or removal shall be born by the contractor unless it could not be reasonably foreseen that such work would be required.

All damage to utilities resulting from the contractors operations shall be repaired at the contractor's expense. Where it is the policy of the utility to perform their own repairs to damaged utilities, the contractor shall cooperate fully with the utility and bear the costs of such repairs.

2.2 EXISTING WATER, SEWER AND DRAIN FACILITIES

In some instances, existing water, sewer or drains may be encountered along the line of work. In all such cases, the contractor shall perform his operations in such manner that the service will not be interrupted, and shall, at his expense, make temporary provisions to maintain such services.

Where it is necessary to cut, remove and/or replace existing storm sewers and drain tiles, the Contractor shall make specific arrangements to maintain the flow of water and shall not place permanent bulkheads in any conduit. Temporary earth dams may be used to confine and/or channel the flow and shall be removed upon completion of the crossing.

The Contractor shall receive no extra compensation for replacement of drains encountered or for relaying same at a new grade or line. Where existing water mains are encountered in the work they shall be maintained in operation to the extent that water service is not interrupted.

2.3 EXISTING GAS, ELECTRIC AND OTHER FACILITIES

Where existing gas mains are encountered, the Contractor shall arrange with the Gas Utility for any necessary location and marking.

The Contractor will give adequate notice to the Gas Utility to allow their location of gas lines ahead of the proposed construction with paint or stakes. The Contractor will be required to expose the gas mains prior to dynamiting and excavation, where crossing pipeline installations. Track drill operations will be ceased short of the gas main and will resume on the other side of the main. The material under the gas line will be removed with hand drills and/or jack hammers. The Contractor shall contact the Gas Utility for restrictions on blasting in the vicinity of the gas line, and comply therewith.

Before backfilling a trench in which a gas main has been exposed, the Contractor shall notify the Gas Utility to inspect the exposed main and perform any protective measures deemed necessary.

The forgoing provisions pertaining to gas lines shall apply to all natural gas, petroleum and other fuel pipelines.

Where existing underground electric or telephone facilities are encountered, the Contractor shall take the necessary measures to work around the facilities or arrange with the Electric Company or Telephone Company for any necessary relaying. Repairs made necessary by damage to any facilities by the Contractor shall be charged to the Contractor.

2.4 DEWATERING

The Contractor shall perform all pumping, well pointing, ditching and any other necessary procedure to keep the excavation clear of groundwater, storm water, or sewage during the progress of the work and until the completed work is safe from injury.

The Contractor shall maintain dewatering operations such that no groundwater, storm water, or sewage will be allowed to build up over any concrete and/or masonry at manholes or structures for a period of 6 hours. This time period will be adjusted by the Engineer should temperature and curing conditions warrant.

All water pumped or drained from the work shall be disposed of in a manner satisfactory to the Engineer without damage to adjacent property or to other work under construction. The contractor shall not dispose of storm or surface water through sanitary sewerage facilities.

It shall be the Contractor's responsibility to take all necessary precautions to protect all construction against flooding and/or flotation from hydrostatic uplift.

All dewatering procedures and maintenance thereof shall be considered an incidental part of pipe laying and construction operations and no separate payment will be allowed therefor.

Dewatering operations for structure construction shall be such that the groundwater or surface water is not being pulled over, around, or through the freshly placed concrete or masonry. The use of multiple pumps in the trench may be required. When required to protect the freshly placed concrete and/or masonry, timber or plywood forms will be positioned around in the concrete or masonry so that the dewatering operations will not cause a separation of cement and aggregate. The cost of these dewatering and/or protection procedures shall be considered incidental to construction and merged into the appropriate bid items.

2.5 BARRICADES AND WARNING SIGNS

The Contractor shall furnish, erect, and maintain such barricades, fences, lights, and danger signals and take other precaution measures that will insure the protection of persons, property and the work.

2.6 MAINTENANCE AND ACCESS OF TRAFFIC

Portions of the work are located in developed areas requiring the access for fire and other departments to be provided for; at least one free lane shall be available for all traffic. Contractors are to arrange operations in these areas to meet these requirements and secure approval of operating procedures from potentially affected Central City Street Department, Muhlenberg County Road Department and the Kentucky Highway Department as appropriate in Kentucky.

Where water lines are constructed under paved roadway surfaces, within public right-of-ways, the Contractor will restore the asphalt or crushed stone pavement and/or shoulders between shoulder lines. It shall be the responsibility of the Contractor, upon completion of the installation, to regrade the street to the template that existed prior to construction. This regrading shall be satisfactory to the entity owning the road.

The Contractor shall further be responsible for the maintenance of disturbed streets until re-paving operations have been completed.

The Contractor shall restore all curbs, gutters, sidewalks, ramps and private driveways or parking lots. This work shall be considered as incidental to the construction of the proposed water line and, therefore, no additional compensation will be allowed for the restoration of these items.

The Contractor shall also be required to restore, at his own expense, all pavements disturbed by his operations where the water line was not constructed under the pavements. He shall further be required to replace at his own expense all pavements disturbed in the correction of water line deficiency discovered after restorations have been completed.

3.0 MATERIAL AND EQUIPMENT

Materials, products and equipment shall be properly containerized, packaged, boxed and protected to prevent damage during transportation and handling. Provide suitable temporary weather tight storage facilities as may be required for materials or equipment that will be damaged by storage in the open. Protect from damage all materials delivered at the site. Do not use damaged material in the work.

Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the respective manufacturers unless directed otherwise by the provisions of these Specifications.

4.0 SPECIAL CONDITIONS

The Contractor's attention is called to the special conditions (i.e. road crossings, construction in road right-of-way, etc.) indicated on the Plans. The Plans and Specifications reflect the type of construction that is anticipated in the various locations requiring special attention, but it shall be the responsibility of the

Contractor to contact the various agencies including the State Highway Department, the Gas Company, Telephone Company, Corps of Engineers, and other utilities and/or entities involved when working in areas where they will be concerned, and for coordinating construction with their requirements in such a way to avoid conflicts, damage or interruptions in service.

(a) The Contractor shall perform his work in such a manner that normal service on existing water lines and service to customers is maintained to the maximum extent possible. Such service shall be disrupted only at times and in such a manner as approved by the owner of the utility.

(b) The Contractor shall submit a work schedule to the Engineer for approval prior to beginning work. The schedule shall establish the planned sequence of line installation, and property restoration for the project.

(c) The Contractor shall maintain access to businesses and residences to the maximum extent possible.

(d) Easement Restrictions - The Contractor shall exercise due care in staying within the right of way and easements obtained for the proposed construction, and will be held strictly accountable for violations thereof. Any additional access to, or use of private property must be arranged by the Contractor, at his expense, by negotiation with the property owner involved.

5.0 TESTING

The Specifications for materials designate the testing applicable for materials incorporated in the work. Testing shall be done by the manufacturer in accordance with the applicable ASTM specification. Manufacturer shall furnish the Engineer with three (3) certified copies for the test results.

The Owner may, at his option, elect to have an independent testing laboratory test materials to be furnished for incorporation in the work. Such testing, when done, shall be in accordance with provisions of the Specifications for Materials.

Acceptance testing for installed water line will be limited to visual inspection, disinfection testing, pressure testing and evaluation of the installed performance of the line unless directed otherwise by the Engineer.

6.0 WARRANTY

The work to be performed under this Contract shall be guaranteed against defects in materials or workmanship for a period of one year following the date of formal acceptance of the project. In the event defects in materials or workmanship should appear, the Contractor shall promptly make the necessary correction. When the defects are not of an emergency nature, the Contractor will be notified and will be given a period of two weeks in which to make the necessary corrections. Should the defect be of an emergency nature, which in the opinion of the Owner or the Engineer requires immediate correction, the Contractor will be notified and requested to make the necessary repair immediately. Should this be impractical, or if the Contractor should fail to respond to the request for corrective action within the specified period, the Owner may proceed to have the defects corrected and shall bill the Contractor for all charges in connection therewith including labor, materials, and equipment rental. Such charges may be deducted from amounts due the Contractor if any of the Contractor's money has been withheld. In the event the Contractor fails, refused, or neglects to pay the Owner, the Surety shall be liable for such charges,

7.0 MAINTENANCE OBLIGATION

The Contractor shall be fully responsible for maintenance of any and all portions of the work that he performs under this Contract for a period of 30 days. This maintenance obligation shall begin upon formal acceptance of the project and is intended to place a limit upon the Contractor's responsibility for normal maintenance required for the routine operation of the system. This 30 day obligation shall not be construed as relieving the Contractor of the responsibility for maintenance or repair work resulting from defective materials or workmanship during the warranty period.

END OF SECTION 02-100

Section 02-200

PIPING AND VALVES

1.0 SCOPE OF WORK

This section describes piping, valves (if specified) and related items to be used in performance of the work.

2.0 MATERIALS

2.1 PVC Water Pipe (if applicable)

PVC pipe for water shall be manufactured in accordance with ASTM D2241 and have NSF approval. The pipe shall be Class 200 or Class 250 polyvinyl chloride plastic (PVC 1120) SDR-21 or SDR-17, respectively. The following tests shall be run for each machine on each size and type of pipe being produced, as specified below:

Flattening Test: Once per shift in accordance with ASTM D2412. Upon completion of the test, the specimen shall not be split, cracked or broken.

Acetone Test (Extrusion Quality Test): Once per shift in accordance with ASTM D2152. There shall be not flaking, peeling, cracking, or visible deterioration on the inside or outside surface after completion of the tests.

Quick Burst Test: Once per 24 hours in accordance with ASTM 5199.

SDR	Pressure Rating	Minimum Bursting Pressure, PSI
17	250	800
21	200	630

Impact Tests: 6" and smaller, once each 2 hours in accordance with ASTM D2444.

Wall Thickness and Outside Dimensions Test: Once per hour in accordance with ASTM D2122.

Bell Dimensions Test: Once per hour in accordance with ASTM D3139.

If any specimen fails to meet any of the above-mentioned tests, all pipe of that sized and type manufactured between the test period must be scrapped and a full set of tests rerun.

Furnish a certificate from the pipe manufacturer stating that he is fully competent to manufacture PVC pipe of uniform texture and strength and in full compliance with these specifications and further stating that the company has manufactured such pipe for a continuous period of at least ten years. In addition the manufacturer's equipment and quality control facilities must be adequate to ensure that each extrusion of pipe is uniform in texture, dimensions, and strength. Also furnish a certificate from the manufacturer certifying that the pipe furnished for this project meets the requirements of these Specifications.

All pipe shall be manufactured in the United States of America. All pipe for any one project shall be made by the same manufacturer.

The pipe shall be furnished in laying lengths of 20'. The Contractor's methods of storing and handling the pipe shall be approved by the Engineer. Pipe shall be fully supported as recommended by the manufacturer. Stringing pipe along the proposed route in excess of one day's work will not be allowed.

Certain information shall be marked on each piece of pipe. At the least, this shall consist of:

Nominal Size
Type of material
SDR or class
Manufacturer
NSF Seal of Approval

Pipe that fails to comply with the requirements set forth in these Specifications shall be rejected.

2.2 Ductile Iron Water Pipe

Ductile iron pipe shall meet the requirements of ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51 and shall be NSF approved. All ductile iron pipe shall have a minimum pressure rating as specified on the Drawings. All ductile iron pipe shall be cement lined with an asphalt coating on the exterior of the line. In standard buried installation, ductile iron pipe shall be supplied with push-on type joints with SBR rubber, or other gasket material suitable for continuous service in a buried potable water pipeline. Pipe which will be exposed (e.g. above grade, or in vaults or buildings) shall have flanged joints. Pipe size, pressure class, NSF seal, and manufacturer's name shall be clearly marked on the exterior of each pipe joint.

All ductile iron pipe shall have Underwriter's Laboratories, Inc. approval and shall be approved by the National Sanitation Foundation for potable water use. All ductile iron pipe and fittings shall be manufactured in the United States. All pipe for any one project shall be made by the same manufacturer.

Restrained joint pipe and fittings shall meet all other requirements for ductile iron pipe and fittings set forth above, plus having a positive means of restraining the pipeline joint against separation due to a maximum internal working pressure equal to 350 psi. All areas specifically designated for restrained ductile iron pipe (i.e. bends, steep slopes or bores) shall be done utilizing regular ductile iron pipe equipped with restraining gaskets. The gaskets shall be equivalent to the American Fast-Grip restrained joint gaskets product.

2.3 Fittings

All fittings shall be cast gray iron or ductile iron, cement lined, bituminous coated, manufactured in accordance with AWWA/ANSI Standards A21.10 and A21.11, latest revision, unless otherwise indicated or directed. Minimum pressure rating shall be 250 psi. Unless indicated otherwise on the Drawings, mechanical joint fittings shall be used.

2.4 Valves

A. Resilient Seat Gate Valves

Gate valves shall be iron body, resilient rubber seat type valves with non-rising stems. Three inch and smaller valves may be bronze body. Resilient seat gate valves shall have a bronze stem nut cast integrally with the cast iron valve disc. The valve shall be capable of being installed and operated in either direction and shall be furnished with mechanical joint ends. Valves shall be suitable for installation in an approximately vertical position in buried pipe lines. Stem seal shall consist of O-ring seals. All valves shall open to the left (counter-clockwise), and shall be provided with 2" square operating nut. All underground gate valves which have nuts deeper than 30' below the valve box top shall have extended stems with nuts located within one foot of the valve box cap.

Valves shall be for working pressures up to 250 psi and shall be equal to latest specifications of AWWA C-509 in all respects. Valves shall be equal to US Pipe Metroseal 250 or Mueller A-2360. All components shall be manufactured in the United States of America.

Valves which are to be located within a section of restrained joint pipe shall be equipped with a restraint mechanism equal to Megalug 1100 Series. The pressure rating of the restraint mechanism shall equal 350 psi. Gate valves used in exposed piping applications shall have flanged ends and shall be supplied with a standard handwheel operator.

B. Butterfly Valves (if applicable)

Buried butterfly valves shall be cast iron body and disc with stainless steel reinforced rubber disc seat. The valve shall have an offset disc and stub shaft design allowing minimal head loss through the valve, and consistent drip tight closure. The valve shall be capable of being installed and operated in either flow direction and shall be furnished with mechanical joint ends. Valves shall be suitable for installation in an approximately vertical position in buried pipelines. The disc and internal flow path shall be coated with a two-part thermosetting epoxy. The valve exterior shall be coated with asphaltic varnish. All valves shall open to the left (counter-clockwise), and shall be provided with 2" square operating nut. All underground butterfly valves, which have nuts deeper than 30' below the valve box top, shall have extended stems with nuts located within one foot of the valve box cap.

Valves shall be suitable for maximum working pressures up to 250 psi and shall be equal to latest specifications of AWWA C-504 in all respects. Valves shall be equal to Mueller B-5227.

Valves which are to be located within a section of restrained joint pipe shall be equipped with a restraint mechanism equal to Megalug 1100 Series. The pressure rating of the restraint mechanism shall equal 350 psi.

Manual butterfly valves used in exposed piping applications shall meet the above requirements, but shall have flanged ends and shall be supplied with a standard handwheel operator. Valves shall have a factory-applied epoxy paint coating to exposed surfaces.

C. Electric Valve Operators (if applicable)

Where valve are specified to be equipped with electric actuators, provide electrical valve operators Rotork IQT 2000, Limitorque, Auma, or equal. The motorized valve operators shall be 120-volt, single phase, and 60 Hz. Motorized valve operators shall be sized for a minimum of one and one-half times the valve manufacturer's torque requirements. The minimum pressure for determining torque requirements for valve operator shall be based on pipe service test pressure or 25 psi, whichever is greater.

Automatic control shall be through a remote panel as listed in Section 16940–Controls and Instrumentation. Each actuator shall be supplied with an integral pushbutton station containing three buttons (open/stop/close); three indicator lights, one green (closed), one amber (fault), and one red (open), and three-position selector switch, lockable in each of the three positions (Local/Off/Remote). In the "Local" position, the actuators shall be operated from the local pushbutton station. In the "Remote" position, the actuators shall be controlled from open/close dry contacts from the remote panel. An auxiliary contact shall be provided for "In Remote" indication.

The electric valve actuators shall include the motor, motor heater, actuator unit gearing, reversing motor starter package, with control power supply transformer, phase discriminator, interface board with optically isolated input signals, and monitor relay for collective fault signal, position limit switches, torque switches, declutch lever and handwheel, as a self-contained unit. The actuator shall meet the latest revision of the applicable AWWA specification. The motors shall be specifically designed for valve actuator service and shall be of high-starting torque, totally enclosed, nonventilated construction. Motor insulation shall be a minimum NEMA Class F, with a maximum continuous temperature rating of 155°C (rise plus ambient) for one complete open-to-close (or reverse) cycle.

The motors shall be of sufficient size to open or close the valve at the maximum stated torque. The motor shall be capable of operating at ±10 of nominal voltage. The motor duty-rating shall be sufficient for one complete cycle (open-close-open or reverse) without exceeding its temperature rating. Motor bearings shall be of the antifriction type and permanently lubricated. The motors shall be an independent subassembly so that the power gearing shall not be an integral part of the motor assembly to allow for motor or gear changes dictated by system operation changes.

The motors shall be equipped with internal thermal contacts to protect against motor overload. The actuator shall be a multiple reduction unit with power gearing consisting of spur or helical gears and worm gearing. Antifriction bearings with caged balls or rollers shall be used throughout. All rotating power-train components shall be immersed in grease with provisions for inspection and relubrication without disassembly. Lubricants shall be suitable for ambient conditions of -20°F to 150°F. The actuators shall have a built-in device that allows the motor to reach full speed before engaging the valve load when required by unseating applications.

A handwheel shall be provided for manual operation of each motor-operated valve with arrow to indicate "open" rotation. The handwheel shall not rotate during motor operation. A fused motor shall not prevent manual operation. When in manual-operating mode, the actuator will remain in this mode until the motor is energized, at which time the actuator will automatically return to electric operation. Movement from motor operation to handwheel operation shall be accomplished by a positive, padlockable declutching lever, which mechanically disengages the motor and related gearing. It shall be impossible for simultaneous manual and motor operation to occur. Friction-type declutch mechanisms are not acceptable. Position limit switches and associated gearing shall be an integral part of the valve actuator. Limit switch gearing shall be of the intermittent type, made of bronze or stainless steel, grease-lubricated and totally enclosed, to prevent dirt and foreign matter from entering the gear train. Limit switch contacts shall be heavy-duty and silver-plated with wiping action. The actuator shall have 16 contacts, four-contact/four-rotor type, all of the same basic design. As an alternative, a limit switch assembly may be directly coupled to the valve stem eliminating the need for intermittent gearing, and providing six Single Pole Double Throw (SPDT) contacts. Contacts shall be convertible from N/O to N/C, or reverse. Provide a dry contact for "In Remote" indication at SCADA System. Provide limit switches for "Valve Opened" and "Valve Closed" indication at SCADA System.

Switches shall be adjustable, allowing for trip points from fully-open to fully-closed positions of valve travel. They shall not be subject to breakage or slippage due to over-travel. Limit switch design shall permit visible verification of switch position without disassembly. Each valve actuator shall be equipped with a switch that will interrupt the control circuit in both the opening and closing directions when valve torque-overload occurs. Contacts shall be silver-plated. The torque switch shall have graduated dials for both open and close directions of travel, and each shall be independently adjustable. The torque switch shall include a positive means to limit adjustability so as not to exceed the actuator output torque capability. The activating spring pack shall be of the Belleville spring design. Switch design shall permit visible verification of switch position without disassembly.

Enclosures shall be NEMA 4X. Provide watertight compartment between terminal compartment and the balance of the actuator. Enclosure shall be submersible to IP68 standard of 20 feet for 72 hours.

2.5 Valve Box Frames and Covers (if applicable)

Valves box frames and covers shall be made of heavy cast iron and shall meet the requirements of ASTM A-48, class 30, and shall be three-piece, 5 1/4" diameter barrel, screw type construction.

All casting shall be made accurately to the required dimensions and shall be sound, smooth, clear and free of blemished or other defects. Defective castings which have been plugged or otherwise treated to remedy defects shall be rejected. Contract surfaces of frames and covers are to be machined so that they rest securely in the frames with no rocking. The cover shall be in contact with the frame for the entire perimeter. The valve box frames and covers, marked "Water", shall be equal to Russco B-129.

2.6 Casing Pipe (if applicable)

Where noted on the Drawings or required by these Specifications, roadway crossings shall be made utilizing carrier pipe within a casing pipe. Sizes of carrier pipe and casing pipe shall be as noted on the Drawings.

Casing joints shall be of fully welded, leak proof construction. The steel casing pipe shall have a minimum yield strength of 35,000 psi and shall have the minimum wall thickness of 0.25 inches for 12" nominal diameter and smaller pipe. Casing pipe larger than 12" shall have a wall thickness corresponding to ASTM standards for Standard Weight steel pipe. Steel casing pipe shall be coal tar protected according to AWWA Standard C203-91 and C209-20. Pipe shall be welded according to AWWA Standard C206-91 unless otherwise specified.

2.7 Pipeline Detection Wire

Pipeline detection wire shall be No. 12 solid copper insulated wire. The wire shall be attached to the top of the installed pipe with duct tape prior to backfilling, and the detection wire shall be spliced to seal out moisture. The splicing kit shall be or equal to 3M direct Bury Splice Kit (DBY). Completed sections of detection wire shall be periodically checked for continuity by the Contractor. The Contractor is responsible for the continuity of the wire sections, and shall take measures during construction to insure a working final product. If, upon completion of the continuity test, a section of wire fails, the Contractor shall make corrective measures and the test will be repeated until satisfactory results are obtained.

Precast concrete valve rings, with an embedded copper locator pin, will serve as a wire terminal point for testing and locating.

2.8 Flushing Hydrant (if applicable)

Large Flushing Hydrants, where specified, shall be 5¼" nominal diameter with 3-way outlet equal to Mueller A-421. All components shall be manufactured in the United States of America.

2.9 Casing End Seals & Spacers (if applicable)

Casing end seals shall be heavy-duty rubber seals (Model ESW) as manufactured by CCI Pipeline Systems or approved equal. Casing Spacers shall be of heavy-duty two-piece stainless steel as manufactured by CCI Pipeline Systems (Model CSS-center restrained) or approved equal.

2.10 Valve Markers

Plastic blue valve markers shall be TriView marker as manufactured by Rhino with owner's name and phone number imprinted on the marker. The 54 inch TriView markers shall be anchored by a 6 foot, 1.2 lb (2" dia. max.) steel U-channel. The U-channel shall be driven into the ground 2 feet with 48 inches left above ground to allow for the TriView marker to be installed over the top and fastened at the base.

2.11 Crushed Stone

Crushed stone for pipe bedding and/or backfill shall meet the quality requirements of ASTM D692 and the grading requirements referenced on the plans.

2.12 Precast Valve Boxes & Other Items

Precast concrete valve rings shall be 24-inches in diameter and 4-inches thick. Each ring shall be equipped with an embedded copper locator test pin, which will serve as a detection wire terminal point for locating nonmetallic pipelines.

Precast concrete items shall meet all requirements of ASTM C478. All concrete used in precast items shall have a compressive strength of at least 4,500 psi at 28 days.

2.13 Tapping Sleeves and Valves

Tapping sleeves shall consist of a mechanical joint tapping sleeve equal to Mueller H-615 (for non-PVC tapped pipe) or Ford FAST (for PVC tapped pipe). Tapping valves shall conform to all applicable specifications for resilient seat gate valves. All components shall be manufactured in the United States of America.

2.14 Miscellaneous Items

Pipe supports shall be as manufactured by Grinnell. Pressure gauges shall be equal to Ashcroft 35-1009AW (reading 0 to 200 psi) and provided with a bronze isolation ball valve. Hose bibbs located in exposed piping shall be equal to Nibco 44/45U, ¾ inch.

2.15 Valve Insertion

Valve Insertion (4"-16"), where specified, shall meet general specifications of AWWA C-509-09 Resilient Wedge Material and AWWA M44 Water Supply Practices. The valve and gate body shall be ductile iron (ASTM.A536-65-45-12) with EPDM gate rubber and stainless steel valve stem. Fasteners shall be of a cathodic protected material or stainless steel, and the coating shall be corrosion-protection E-coating casting. The design of the valve shall include a pressure rating of 250 PSI with a 360 degree rubber seal around the wedge. The valve turns shall match that of a normal resilient seat gate valve. Valve Insertions shall be equal to Advanced Valve Technologies EZ Valve II Insertion.

2.16 Master Meter

A. Turbine Meters

Turbine master meters are to be Badger Meter Recordall Turbo Series or approved equal. The meter shall be equipped with a built-in strainer and test port. Meter shall include a submersible rated direct mount digital display with a two-wire loop powered 4 to 20 mA output to SCADA. Flow meter shall include integral or local surge protector for the 4-20mA current loop at or near the meter electronic register.

B. Magnetic Meters

Magnetic master meters, coordinated with the SCADA telemetry integrator, are to be ABB Watermaster Electromagnetic Flow Meter or approved equal. The meter shall include a submersible rated flow head with remote mount digital display with internal powered to 4 to 20 mA output to SCADA. Flow meter shall include integral or local surge protector for the 4-20mA current loop at or near the meter electronic register.

2.17 Flow Control Valve

A. Function

There shall be provided as shown a diaphragm type control valve serving the combined function of electronic interface control of flow under RTU direction and with pressure reducing function hydraulically operated and with solenoid override to put the valve under control of hydraulic pilots upon power failure or loss of outlet side communication at the RTU. The valve shall be Cla-Val model (131 Series) or approved equal. The valve shall include the VC-22D Electronic Valve Controller and the X117 Series Valve Position Transmitter.

B. Main Valve

The valve shall be hydraulically operated, single diaphragm-actuated, globe pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearings installed and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Valve shall be heat fusion bonded epoxy coated on its interior and exterior surfaces.

C. Main Valve Body

No separate chambers shall be allowed between the main valve cover and body. Valve body and cover shall be of cast ductile iron. The valve shall contain a resilient, synthetic rubber disc, with a rectangular cross-section contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. The disc guide shall be of the contoured type to permit smooth transition of

flow and shall hold the disc firmly in place. The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks. It must have straight edge sides and a radius at the top edge across this surface.

The diaphragm assembly containing a non-magnetic 303 stainless steel stem of sufficient diameter to withstand high hydraulic pressures shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. The seat shall be a solid, one-piece design and shall have a minimum of a five-degree taper on the seating surface for a positive, drip-tight shut off.

The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The center hole for the main valve stem must be sealed by the vulcanized process or a rubber grommet sealing the center stem hole from the operating pressure. The diaphragm must withstand a Mullins Burst Test of a minimum of 600 psi per layer of nylon fabric and shall be cycle tested 100,000 times to insure longevity. The diaphragm shall not be used as the seating surface. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully opened or fully closed position.

The main valve seat and the stem bearing in the valve cover shall be removable. The cover bearing and seat in 6" and smaller size valves shall be threaded into the cover and body. The valve seat in 8" and larger size valves shall be retained by flat head machine screws for ease of maintenance. The lower bearing of the valve stem shall be contained concentrically within the seat and shall be exposed to the flow on all sides to avoid deposits. To insure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. Cover bearing, disc retainer, and seat shall be possible without removing the valve from the pipeline.

The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years in accordance with all applicable instructions. Electrical components shall have a one year warranty.

D. Pilot Control System

The pressure reducing pilot control shall be a direct-acting, adjustable, spring-loaded, normally open, diaphragm valve designed to permit flow when controlled pressure is less than the spring setting. The pilot control is held open by the force of the compression on the spring above the diaphragm and it closes when the delivery pressure acting on the underside of the diaphragm exceeds the spring setting. The pilot control system shall include a fixed orifice.

The valve shall include a set of solenoid valves to provide the required valve functions for positioning mode and for pilot operated mode. There shall be provided on each valve a dual, stem mounted, limit switch assembly wired to the RTU through the interface panel. The solenoid valves shall be equipped with manual by-pass valve cocks.

3.0 INSTALLATION

All piping, valves (if specified) and related items are to be installed as recommended by the manufacturer and as indicated on the plans.

4.0 TESTING & ACCEPTANCE OF PIPING

Upon completion of the construction work the Contractor shall conduct the necessary pressure and leakage tests, and shall disinfect the completed water mains and appurtenances. The Contractor shall furnish all labor, tools, equipment and materials for making the tests. In the event that the pressure or leakage test is unsatisfactory, or bacteriological tests indicate that disinfection is incomplete, the Contractor shall take corrective measures and shall repeat the tests until satisfactory results are obtained. Tests shall be made in the presence of an authorized representative of the Engineer.

4.1 Pressure and Leakage Tests of Piping

Each section of the completed water main extension shall be subjected to a pressure test. The section to be tested shall be valved off after having been filled with water, and a positive displacement test pump shall be used to pump clean water into the section to build up a test pressure of at least 150 psi at the highest point within the section of line being tested, but not exceeding 200 psi at the lowest point. The test pump shall then be valved off from the system and the pressure shall be observed over a period of four hours. A drop in pressure of 5 psi or more during the first hour of the four test shall be taken as a indication of leakage. In the event leaks are found and corrected, the Contractor shall repeat the pressure test using the same procedure described above. Should the Contractor be unable to obtain a satisfactory pressure test over a duration of four hour, he shall then be required to perform a leakage test using a water tap and standard water meter to measure the leakage in the test section at system pressure over a period of 24 hours. Leakage during the 24 hour period must not exceed the allowable leakage for mechanical or push-on joints as shown in Table 7 of ANSI/AWWA C600, latest revision. Should the system fail to pass the leakage test, the Contractor will be required to locate and correct the leaks and to retest the system until satisfactory results can be obtained.

The Contractor shall provide suitable first quality pressure gauges with 5 lb. or smaller graduations and a standard 5/8" X 3/4" water meter in the event the meter is required for the leakage test. Pressure gauges and water meter shall be in good condition and shall be subject to such tests for proof of accuracy as the Engineer may require.

4.2 Disinfection of Piping

All water main extensions and appurtenances shall be disinfected upon completion, and after the system has been flushed to remove dirt or foreign objects which may have been accidentally introduced into the line. Disinfection shall be accomplished by use of a main sterilizer for applying chlorine gas or a hypo-chlorinator for application of a hypochlorite solution.

The chlorine shall be introduced into the main as water is being added so that adequate mixing will occur. Chlorine shall be added until a concentration of not less than 50 parts per million of available chlorine is observed at check points throughout the section being disinfected. The chlorine solution shall be left in the mains for a period of 24 hours after which the mains shall be flushed until only the normal residual chlorine found in tap water is present. Samples of water shall then be taken by standard sampling methods approved by the Engineer and the Owner and shall be submitted to a certified bacteriological testing laboratory for analysis. In the event any of the bacteriological samples show the presence of coliform organisms, the disinfection procedure shall be repeated until samples of satisfactory bacteriological quality can be obtained.

The Contractor shall furnish the chlorine for main disinfection and shall furnish all labor, tools and equipment for the disinfection. The Owner will furnish water for one cycle of disinfection and flushing. Water for subsequent testing of a line will be charged to the contractor. Disinfection procedures shall generally be in accordance with the AWWA Standard for Disinfecting Water Mains. AWWA C601, latest revision.

4.3 Water for Testing of Piping

The pipeline shall be tested using potable water. The Contractor shall make arrangements with the Owner prior to testing for quantity and suitable testing times based upon demand conditions. The Contractor is responsible for making and removing any temporary connections between the water main and the existing potable water lines, and coordinating the work with the affected utility. Any temporary taps, blowoffs, or other modifications to the water main to facilitate flushing are also to be made and removed by the contractor.

The rate at which water may be drawn from the utility providing the test water shall be set by the utility, and the Contractor will be required to limit the draw of water as dictated by the utility. During certain times of the year or certain demand conditions, water for testing may not be available. If this occurs, testing may be delayed as necessary to accommodate the water shortage, and the Contractor shall be granted an extension of contract time commensurate with the delay.

4.4 Pipe Detection Wire Continuity Test

Pipeline detection wire shall be No. 12 solid copper insulated wire. The detection wire shall be spliced to seal out moisture. The splicing kit shall be or equal to 3M direct Bury Slice Kit (DBY). Detection wire shall be accessible at all valves, air releases and other pipeline appurtenances for connection to detection equipment. Completed sections of detection wire shall be periodically checked for continuity by the Contractor. The Contractor is ultimately responsible for the continuity of the wire sections, and shall take measures during construction to insure a working final product. If, upon completion of the continuity test, a section of wire fails, the Contractor shall make corrective measures and the test will be repeated until satisfactory results are obtained. **Upon project completion, the contractor shall demonstrate to the Owner and/or Inspector with a locator device continuous continuity along the completed pipeline.**

END OF SECTION 02-200

Section 02-300

WATER MAIN CONSTRUCTION

1.0 PRELIMINARY WORK

1.1 Location of Lines

The roads along which lines are to be laid, and the general location of the proposed lines is indicated on the plans. The Contractor shall install the proposed lines and appurtenances in the locations indicated on the plans, except where field conditions are encountered which warrant relocation. Any field relocation of the pipelines and appurtenances shall be approved by the Engineer's Representative at the time of construction. In no event shall any improvements be installed outside of properties, easements or right-of-way secured by the Owner for the Project.

1.2 Locations and Protection of Underground Utilities

Prior to trenching, excavating, or disturbing the ground surface in any manner, the Contractor shall determine, insofar as possible, the actual location of all underground utilities in the vicinity of the proposed construction and shall clearly mark their locations so that they may be avoided by equipment operators. Where such utility lines appear to lie in the path of construction, they shall be uncovered in advance to determine the exact location and depth, and to avoid damage due to Contractor's operations. Existing facilities shall be protected during construction, or removed and replaced in equal condition as necessary.

Should any existing utility line or service be damaged during, or as a result of the Contractor's operations, the Contractor shall take such emergency measures as may be necessary to minimize damage and shall immediately notify the utility involved. The Contractor shall then repair the damage to the satisfaction of the utility or shall pay the utility for making the repairs. In all cases, the restoration or repair shall be such that the repaired item will be in as good or better condition as before the damage occurred.

1.3 Removal of Obstructions

The Contractor shall be responsible for the removal, safeguarding and replacement of fences, walls, structures, culverts, street signs, billboards, shrubs, mailboxes, or other obstructions which must be moved to facilitate construction. Such obstructions must be restored to at least their original condition.

1.4 Clearing and Grubbing

The contractor shall be responsible for cutting, removing and disposing of all trees, brush, stumps, roots, and weeds within the construction area. Disposal shall be by means of chippers, landfills, or other approved methods not in conflict with State of local ordinances.

Avoid cutting or damage to trees not in the construction area. The Contractor will be responsible for the replacement of trees, shrubs, etc. unnecessarily damaged or removed.

1.5 Crops and Livestock

Any agricultural crop or product, or any livestock that is injured, damaged, lost or destroyed by the construction operations shall be the responsibility of the Contractor. The Contractor shall take precautions to avoid or minimize such damage, and shall compensate the owner of the crop or livestock for any loss that may result from construction operations.

2.0 EXCAVATION

2.1 General

The Contractor shall perform all required excavation and backfilling incidental to the installation of the water line, valves, services, and other appurtenances under this contract. Excavation shall be carried to the depths indicated on the Drawings or as necessary to permit the proper installation of pipe, bedding, structures or appurtenances. Care shall be taken to provide a firm, undisturbed, uniform surface in the bottoms of trenches and excavations. Where the excavation exceeds the required depth, the Contractor shall bring the excavation to proper grade through the use of an approved incompressible backfill material (generally crushed stone or fill concrete, depending upon the nature of the item to be placed thereon). In the event that unstable soil conditions are encountered at the bottom of the excavation, the Engineer may direct the Contractor to continue the excavation to firm soil, or to provide a suitable special foundation.

The Contractor shall take such precautions as may be necessary to avoid endangering personnel, pavement, adjacent utilities or structures, etc. through cave-ins, slides, settlement or other soil disturbance resulting from his operations.

The Contractor shall be responsible for storage of excavated materials, disposal of surplus excavated material, trench dewatering and other and other operations incidental to excavation and backfilling operations.

2.2 Trenching and Excavation Safety

The Contractor shall be responsible for safe trenching and excavating operations. The Contractor's responsibilities in this regard include complying with all OSHA requirements regarding trench and excavation safety, providing a person knowledgeable in excavation operations and safety (a Competent Person as defined by OSHA) to supervise all trenching and excavation activities, providing all required equipment and supplies to safely complete the work, continuously monitor soil conditions and make adjustments in the trenching and excavation methods (e.g. lay back trench sides, provide shoring, etc.) where necessary to provide for safe working conditions, guarding or barricading open trenches and excavations, and other considerations to insure safety. Providing for the safety of the workers and others in the vicinity of the construction operations takes precedence over all other considerations. Any damage to property, injury or loss of life resulting from trench or excavation failure shall be the sole responsibility of the Contractor.

2.3 Classification of Excavation

Excavation shall be unclassified and the cost of excavation shall be merged into the price per foot for the water main. No distinction will be made between rock and soil excavation, and no claim for additional payment will be considered if based upon the type or character of material encountered.

2.4 Pavement Removal

Where existing paved streets, roads, parking lots, drives or sidewalks must be disturbed during construction of the project, the Contractor shall take the necessary steps to minimize damage. Permanent type pavement shall be sawed in a straight line before removal, and care shall be taken during excavation to avoid damage to adjacent pavement. Where trucks or other heavy equipment must cross curbs or sidewalks, such areas shall be suitably protected.

2.5 Trench Excavation

Trenches shall be excavated in a neat and workmanlike manner, maintaining proper alignment except where necessary to make deviations to miss obstructions. Trenching for the installation of water distribution piping shall be such that the pipe will have a minimum cover of thirty (30) inches. The bottom of the trench must be shaped by hand and bell holes must be dug so that the full length of pipe is resting on sound trench bottom. Blocking shall not be used. In some cases, more than 30 inches of cover will be necessary to cross under existing utilities, obstructions, etc., or where the completed grade will be below

the grade at the time of construction. This additional depth, when required, shall be merged into the unit bid price for water main construction.

Trenches shall be opened far enough in advance of pipe laying to reveal obstructions, but in general shall not include more than 300 feet of continuous open trench at any time. The Contractor will be required to follow up trenching operations promptly with pipe laying, backfill and clean-up, and in the event of failure to do so, may be prohibited from opening additional trench until such work is completed.

The Contractor shall plan his operations so as to cause a minimum of inconvenience to property owners and to traffic. No road, street or alley may be closed unless absolutely necessary, and then only if the following conditions are met:

1. Permit is secured from appropriate State, County or Municipal authorities having jurisdiction.

2. Fire, police and other emergency services providers are notified before the road is closed.

3. Suitable detours are provided and clearly marked.

No driveway shall be cut or blocked without first notifying the occupants of the property. Every effort shall be made to schedule the blocking of drives to suit the occupant's convenience, and in no case shall a driveway be blocked overnight.

The Contractor shall furnish and maintain barricades, signs, flashing lights, and other warning devices as necessary for the protection of public safety. Flagmen shall be provided as required on heavily traveled streets to help avoid traffic jams or accidents.

Trench width shall be held to a minimum consistent with proper working space for the assembly of pipe. Maximum trench width up to a point one foot above the top of pipe shall be limited to the outside diameter of the pipe plus 16". Boulders, large stones, shale and rock shall be removed to provide clearance of 6" below and on each side of the pipe.

Trench walls shall be kept as nearly vertical as possible with due consideration to soil conditions encountered and when necessary, sheeting or bracing shall be provided to protect life and property.

Where unsuitable soil conditions are encountered at the trench bottom, the Contractor shall remove the additional material as may be directed by the Engineer and replace the excavated material with approved backfill.

The Contractor shall excavate by hand wherever necessary to protect existing structures or utilities from damage or to prevent overdepth excavation in the trench subgrade.

Excavated material shall be stored safely away from the edge of the trench and in such a way as to avoid encroachment of private property.

2.6 Excavation for Structures

Excavation for air release valve installations, metering pits or other appurtenances shall be only as large as may be required for the structure or appurtenance, and for working room around it. In soil, excavation shall generally extend to the outer limits of the structure plus working space at the bottom, and shall slope outward as such an angle as may be.required to insure stability of the excavated face. In rock, excavation shall be carried to a point at least 12 inches outside the structure, or as required to achieve proper placement of the backfill. No rock shall be placed or left within 12 inches of the finished structure.

Care shall be taken as the excavation approaches the desired grade to avoid overdepth excavation and provide a firm and undisturbed soil surface on which footings, slabs or foundations are to be placed. Should the Contractor excavate below the desired grade level, the excavation shall be brought to grade by the use of fill concrete at the expense of the Contractor. The use of tamped earth refill beneath foundations, footings or slabs will not be acceptable.

Where structures rest partially or completely upon rock, the rock shall be excavated to a point 6 inches below the bottom elevation of the proposed structure, and crushed stone refill shall be used to bring the excavation back to grade.

Should the material found at the desired subgrade appear to be unstable or otherwise unsuitable for support of the structure, the condition shall be immediately called to the attention of the Engineer. The Engineer may direct that the unsuitable material be removed and replaced with concrete, or that the foundation design be modified to accommodate the conditions encountered. In any event, work in the area affected by the unstable subgrade shall not proceed until the matter is resolved by the Engineer.

2.7 Rock Excavation

Where rock excavation is encountered in trenches, the excavation shall be carried to a depth of at least 6 inches below the bottom of the proposed pipe. The rock shall also be removed to a width of at least 6 inches beyond the pipe on each side so that no rock is left within 6 inches of the outside wall of the pipe. Where rock is excavated in the bottom of the trench, the trench shall be brought back to grade by the use of crushed stone which shall be compacted to form a stable base for the pipe laying operation. If approved in advance by the Engineer, clean excavated soil that is free from rocks may be used in lieu of crushed stone as bedding.

The Contractor shall exercise all necessary precautions in blasting operations. Suitable blasting mats shall be provided and utilized as required. Blasting shall be done only by experienced personnel with all required training and certifications. Careless shooting, resulting in the ejection of stones or other debris during blasting shall be corrected immediately by the Contractor. The Contractor shall be responsible for any personal injury or property damage that results his from blasting.

No blasting shall be done unless the Contractor shall have taken out the necessary insurance to fully protect the Owner from all possible damages resulting from the blasting operations. The blasting shall be done in accordance with all recognized safety precautions and in accordance with regulations of authorities having jurisdiction. In addition, the Contractor shall exercise the necessary care to safeguard the stores of blasting materials on the jobsite.

Where rock is encountered in the immediate vicinity of gas mains, telephone cables, building footings, gasoline tanks, or other hazardous areas, the Contractor shall remove the rock in a manner that will insure protection of these structures. Care shall be taken in the blasting operations to see that the pipe or other structures previously installed are not damaged by blasting. In general, blasting shall not be done within 25 feet of an existing pipeline or structure.

2.8 Disposal of Surplus Excavated Material

Excavated material that is unsuitable or unnecessary for backfilling shall be disposed of by the Contractor. Disposal may be by landfill, or other legal means. Where material is disposed of on private property, the Contractor is responsible for obtaining permission in writing from the property owner and for restoration of the disposal site to the property owner's satisfaction.

2.9 Subsurface Obstructions

In excavating, backfilling and laying pipe, do not remove, disturb or damage other pipe, conduit or structures without the approval of the Engineer. If necessary, the Contractor shall sling, shore up and maintain such structures in operation, and within a reasonable time shall repair any damage done thereto. Repairs to these facilities shall be made to the satisfaction of the Engineer.

The Contractor shall give sufficient notice to the interested utility of his intention to remove or disturb any other pipe, conduit, etc., and shall abide by their regulations governing such work. In the event that subsurface items are damaged in the prosecution of the work, the Contractor shall immediately notify the proper authorities and shall be responsible for any loss to persons or property caused by the damage.

When pipes or conduits providing service to adjoining buildings are broken during the progress of the work overnight or for needlessly long periods during the day, will not be tolerated, and the Owner reserves the

right to make repairs at the Contractor's expense without prior notification. Should it become necessary to move the position of a pipe, conduit, or structure, it shall be done by the Contractor in strict accordance with instructions given by the Engineer or the utility involved.

The Owner or Engineer will not be liable for any claim made by the Contractor based on underground obstructions being different than that indicated on the Plans. Where ordered by the Engineer, the Contractor shall uncover subsurface obstructions in advance of construction so that the method of avoiding same may be determined before pipe laying reaches the obstructions.

The Contractor shall be governed by instructions of the Kentucky Transportation Cabinet and/or County Road Department regarding the laying of pipe along and/or within State/County Roadways.

2.10 Special Conditions

Special care must be exercised in excavation under or near State Highways, railroads, or other areas as designated on the Drawings in order to avoid or minimize delays or injuries resulting therefrom. Where it is necessary to cross beneath state highways, railroads, or other designated areas, the Contractor shall make such installations as shown on the Drawings and/or as directed by the Department of Highways or the Railroad.

The Contractor's attention is also called to the special conditions associated with the proximity of the Owner's existing water distribution system in relation to improvements indicated on the Plans. Some of the proposed improvements will be constructed adjacent to and/or may encounter existing water lines that must remain in service until the successful testing and completion of the proposed improvements. The Contractor is reminded of paragraph 2.1 of Section 02-100, and the Contractor is urged to use the most appropriate construction measures to produce a suitable finished product while maintaining the integrity of the existing infrastructure.

3.0 INSTALLATION OF WATER LINE AND APPURTENANCES

3.1 General

The Contractor shall use only experienced men in the final assembly of pipe in the trench,, and all pipe shall be laid in accordance with these Specifications and the recommended practice of the pipe manufacturer. Trench bottoms shall be carefully prepared and shall be free of water.

Care shall be exercised to insure that pipe of the proper strength or classification meeting the specifications in every respect is provided at the site of pipe laying operations. Recommended tools, equipment, lubricant and other accessories needed for proper assembly or installation of the pipe shall be provided at the site of work. Any damaged or defective pipe discovered during the pipe laying operations shall be discarded and removed from the site of the pipe laying operations.

The Contractor shall exercise care in the storage and handling of pipe, both on the storage yard and at the site of laying operations. Suitable clamps, slings, or other lifting devices shall be provided for handling large-diameter pipe and fittings.

Pipe may be assembled at grade and lowered into the trench provided that no more than 10 joints are lowered at one time, and the pipe is inspected after it is lowered into the trench to assure that no decoupling of joints occurs.

Bell holes for bell and spigot and mechanical joint pipe shall be dug in the trench to allow entire length of pipe barrel to be bedded and to allow proper jointing of pipe. Alignment of pipe shall be as true as possible in order to avoid air pockets. When work is suspended either for the night or for any other reason, open ends of the pipe shall be securely plugged to prevent the entrance of foreign materials. Dead ends of the pipe and unused branches of crosses, tees, valves, etc., shall be closed with plugs suitable to the type of pipe in use.

Cutting of pipe shall be done in a neat, workmanlike manner without damage to pipe, coatings and linings and so that a smooth end remains at right angles to the axis of the pipe.

3.2 Removal of Water

The Contractor shall be responsible for handling run-off, ground water, and sewage in such a way as to maintain trenches and excavations in a dry condition until the work is completed. Pumps, piping, well points, labor, fuel, and other facilities necessary to control, intercept, remove and/or dispose of water shall be provided by the Contractor at his own expense. Water removed from trenches or holes shall be discharged to natural drains in such a way as to avoid danger or damage to adjacent property owners or sewers. No Pipe shall be laid with water in the bells.

Where the Contractor fails, refuses, or neglects to control water in trenches or other excavations, and corrective work is deemed by the Engineer to be necessary as a consequence thereof, such work shall be at the Contractor's expense.

3.3 Polyvinyl Chloride Pipe (Class 200 PVC)

Installation of polyvinyl chloride pipe shall conform to ASTM 2321 and AWWA C900, latest revision. Pipe shall be bedded in clean, uniform soil or compacted granular material and compacted granular material to a point 8" over pipe. Blocking shall not be used to bring the pipe to grade. Whenever it is necessary to cut a joint of pipe in order to fit the trench conditions, the cutting may be made with either hand or mechanical saws or plastic pipe cutters. The cut shall be square and perpendicular to the pipe axis. The cut end shall be beveled as specified by the pipe manufacturer. Assemble all joints by fully seating spigot into bell.

3.4 Ductile Iron Pipe

Installation of ductile iron pipe shall conform to AWWA C150 & C151, latest revision. Pipe shall be bedded and backfilled in conformance with the details shown on the Plans. Blocking shall not be used to bring the pipe to grade. The trench shall be backfilled as indicated on the Drawings so as to achieve a Class III laying condition. Whenever it is necessary to cut a joint of pipe in order to fit the trench conditions, the cutting shall be made in a suitable pipe fabrication shop with mechanical saws. The cut shall be square and perpendicular to the pipe axis. The cut end shall be beveled as specified by the pipe manufacturer. Assemble all joints by fully seating spigot into bell, using an approved gasket lubricant.

Restrained joint ductile iron pipe shall be installed in full conformance with the pipe manufacturer's recommendations. Backfill to 12 inches above restrained joint pipe shall be with granular material (crushed limestone aggregate) to assure maximum friction between the pipe wall and backfill. Should soil conditions be encountered that would require restrained joint pipe to be encased in polyethylene for corrosion protection, an increased length of restrained joint pipe may be required. The Contractor shall ascertain the need for polyethylene encasement from the Engineer sufficiently in advance to allow for installation of the appropriate length of restrained joint pipe.

3.5 Installation of Fittings

Fittings in pipe lines shall be firmly secured to prevent the fitting from being blown off the line when under pressure. When connections are made between the new work and existing mains, the connections shall be made using specials and fittings to suit the actual conditions.

All tees, caps, plugs, bends or other fittings subjected to unbalanced forces tending to pull the joints apart shall be protected with concrete thrust blocks. Thrust blocks shall be provided in accordance with details shown on Drawings, and must bear against an undisturbed trench face. Thrust blocks must be used unless written permission is obtained from the engineer to use special locked-joint fittings, anchoring fittings, or pipe clamps with tie rods.

Fittings shall be placed in locations indicated on Drawings or designated by Engineer and shall be installed in accordance with provisions of these Specifications. Joints shall be as designated under Section 2, Materials.

Before being placed in trench, all fittings shall be subjected to inspection by Engineer; and any defective, unsound or damaged fittings shall be rejected and Contractor shall remove at once from work area.

3.6 Installation of Valves, Valve Boxes

Valves shall be placed in the locations indicated on the Plans or at locations designated by the Engineer. All Valves shall be set vertically. Before being placed in the trench, all valves shall be carefully examined by the Contractor and engineer to see that they are in good working order.

Over each valve shall be placed a valve box. All valves which, when properly set, have operating nuts deeper than 24" below the top of the valve box shall have extension stems with operating nuts located within one foot of the valve box cap.

The valve box shall not come in contact with valve at any point. Backfill around boxes shall be tamped to maintain centered and plumbed alignment of box. The finished valve box installation shall allow a standard valve wrench to be seated on the operating nut and removed easily without contacting the valve box.

Box shall be installed with top set flush with finished surface in paved areas and 1 inch above natural ground level in unpaved areas.

4.0 BACKFILL

4.1 General

Backfilling shall be carried out as expeditiously as possible, but shall not be undertaken until the Engineer's representative has been given the opportunity to observe the work. The Contractor must carry out all backfilling operations with due regard to: the protection of pipes, structures and appurtenances; the use of prescribed backfill materials; and procedures to obtain the desired degree of compaction. No equipment may be used which will result in damage to or misalignment of the pipe.

4.2 Acceptable Backfill Material

All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stones, or other material that in the opinion of the Engineer is unsuitable. From eight inches above the top of the pipe to within six inches of finished grade in unpaved areas, backfill may contain stones up to six inches in their greatest dimension, unless otherwise specified. Backfill containing rock must contain enough soil to fill voids between rocks.

When backfill material is not specified on Project Plans or elsewhere in these Specifications, Contractor may backfill with the excavated material provided material consists of loam, clay, sand, gravel, or other materials than, in opinion of Engineer, are suitable for backfilling.

Backfilling shall not be done in freezing weather and it shall not be made with frozen material. No fill shall be made where material already in trench is frozen. Backfill shall not be made with material which, in Engineer's opinion, is too wet.

Where crushed stone backfill is required the crushed stone shall be No. 57 size as designated by Kentucky Department of Transportation Standards for crushed stone used in road surfacing.

4.3 Backfilling Under Pipe in Rock

Where trench is excavated in rock or shale, a 6" space below pipe shall be backfilled with approved bedding material (#9 or #11 pipe bedding, or uniform soil meeting the approval of the Engineer) to form a cushion for pipe and appurtenances.

4.5 Backfilling Over Pipe

Backfill over pipe may be placed by means of front end loaders, bulldozers or other suitable mechanical equipment provided that the pipe is not damaged or misaligned.

4.6 In Areas Subject to Vehicular Traffic

Where excavation is made through pavement, curbs, driveways, sidewalks, road shoulders, or other areas subject to vehicular traffic or supporting permanent structures, or where such areas, items or structures are undercut by excavation, entire backfill shall be crushed stone (No. 57). Crushed stone shall be carefully placed to achieve maximum density.

Where excavation is made through permanent pavements, backfill shall be placed as described above to subgrade elevation only. Remainder of backfill shall be crushed stone placed as directed to finished pavement grade to serve as temporary pavement.

The last 6 inches of backfill shall be compacted dense grade aggregate to stabilize trench cut.

From time that backfilling is complete until time permanent pavement surface is replaced or, in absence of pavement replacement, until job is accepted, Contractor shall, at direction of Engineer, water streets, roads, etc., to settle dust where excessive dust has, in opinion of Engineer, been caused by Contractor's operations. If Contractor refuses Owner shall, after 24 hours written notice through Engineer, be permitted to proceed with such work with cost to be billed to Contractor.

In Areas Not Subject to Vehicular Traffic- Where excavation is made in areas not subject to vehicular traffic or supporting permanent structures and where settlement is allowable, Contractor may backfill with approved excavated material using acceptable mechanical methods. Backfill material shall be brought up to the original ground level and shall then be mounded over to provide for additional settlement. Compaction of this backfill material will not be required, however, the Contractor shall exercise care to confine the mound to the area immediately over the trench and shall be responsible for bringing in such additional fill material as may be required from time to time during the one year warranty period to fill in areas where excessive settlement has occurred, and to re-seed these areas.

5.0 COMPLETING INSTALLATION OF LINES, STRUCTURES, ETC.

5.1 General

The Contractor shall not, without the permission of the Engineer, remove from the line of work any earth excavated therefrom which may be suitable for backfilling or surfacing until the excavation has been refilled and surfaced.

As soon as the backfilling of any excavation is completed and when in areas of existing development, the contractor must at once begin the removal of all surplus dirt except that actually necessary to provide for the settlement of the fill. He shall also remove all the pipe and other material placed or left on the street by him except material needed for the replacement of paving, and the street shall be opened up and made passable for traffic. Following the above work, the repairing and complete restoration of the street surfaces, bridged, crossings, and all places affected by the work shall be done as promptly as possible. All excavated material shall be cleared from adjacent street surfaces, gutters, sidewalks, parkways, railroads, grass plots, yards etc., and the whole work shall be left in tidy and acceptable condition. Contractor will be required to re-grass lawns or natural grounds where trenches are excavated in these locations or where Contractor has damaged lawns or natural grounds by his operations.

The engineer shall be sole authority in determining time in which rough and final clean-up shall be performed. Rough clean-up shall consist of removal of large rocks, grading of excess backfill material over pipe line or removal of said material, opening of any drainage device, restoration of any street or roadway to condition so that traffic may safely and conveniently use street or roadway, restoration of pedestrian ways to condition where pedestrians may safely and conveniently use same. Rough clean-up shall, in general, be prosecuted no later than 1 day after pipe laying and backfilling or no farther behind

pipe laying operations than 1000 feet; whichever time limit is shortest shall govern. Final clean-up consisting of pavement replacement, sidewalk replacement, removal of small rocks, hand raking with seeding, strawing, etc., of lawns and natural grounds, adjusting grade of ground over pipeline, property repair, and other items shall be prosecuted as soon as is practical after pipe has been laid and backfilled.

5.2 Final Grading and Seeding

Final Grading and Seeding shall be in compliance and equal to the Erosion Control requirements set forth in the Kentucky Transportation Cabinet's (KYTC) Standard Specifications, Section 212.

The Contractor shall perform permanent seeding and final grading for areas where grass growth was damaged or destroyed by the Contractor's operation, and this work shall only be done during the period of September 1 thru April 30, unless specifically waived by the Owner. Between installation and final grading, the affected area must be stabilized by other practical methods to prevent erosion and protect the exposed areas. In areas of established lawns no rock shall be left in the top 6" of soil and the finished grade shall be equivalent to that which existed before construction began. In all cases, lawn and pasture areas shall be left neat and in a condition so that mowing is as easy and convenient as before construction began. The lawn areas and other areas disturbed by the Contractor's activities shall have ground cover restored to a condition satisfying the affected landowner and Owner.

Final Grading and Seeding requirements are as indicated below:

1. Placement of Topsoil: Where warranted and requested, topsoil shall be spread after grading and shaping of the area to receive the material is completed and seeding and protection operations are ready to begin. Spread and lightly compact the topsoil to uniform depth of approximately 6 inches over areas specified by the Owner or Engineer. Topsoil should not be placed on slopes steeper than 3:1.

2. Seed Mixture for Permanent Seeding: For permanent seeding on slopes 3:1 or less, a Type 1 seed mix shall be applied at a minimum rate of 100 pounds per acre. For steeper slopes, apply a Type 3 mix as specified in the KYTC Standard Specification 212.03.03.

   Seed Mix Type 1:
   30% Kentucky 31 Tall Fescue
   20% Creeping Red Fescue
   35% Hard Fescue
   10% Ryegrass, Annual
   5% White Dutch Clover

3. Procedure for Permanent Seeding: Prepare a seedbed and incorporate a minimum of 100 pounds of nitrogen, 100 pounds of phosphate, 100 pounds of potash, and 3 tons of agricultural limestone per acre. Add additional fertilizer and agricultural limestone as needed. Do not apply dry agricultural Limestone when it may generate a traffic hazard. Remove all rock in the top 6" of the soil, and all dirt clods over 4 inches in diameter shall be removed from the surface of the seedbed. All seeding shall be mechanically tracked into the seedbed, utilizing a power seeder, Harley rake, cultipacker, or other approved device. For all slopes 3:1 or greater, ensure that tracking is performed up and down and not across. Seed and mulch to produce a uniform vegetation cover using the seeding rates as indicated to each application. Mulch with clean, weed free straw. Place straw to an approximate 2-inch loose depth (2 tons per acre) and anchor it into the soil by mechanically crimping it into the soil surface or applying tackifier to provide a protective cover. For the periods of March 1 through May 15 and from September 1 through November 1, the Owner will allow the option of using hydromulch at minimum rate of 1,500 pounds per acre in place of straw with tackifier. Regardless of materials used, ensure the protective cover holds until seeding is acceptably established.

4. Maintenance of Seeded Areas during Warranty Period: From the time seeding and protection work begins until the date the project is declared complete (i.e. Warranty Expiration), keep all seeded areas in good condition at all times. Promptly repair any damage to seeded areas or to mulch materials as directed.

5.3 Pavement Replacement

In roadway or driveway areas as soon as the pipe has been installed, the trench shall be backfilled as specified and the surface replaced as indicated below:

1. Asphalt Highway or Roadways

   This item of pavement restoration shall conform to the details included in the Contract Drawings. The leveling course, binder course and the surface course shall be furnished and placed in accordance with Kentucky Department of Transportation Standard Specifications.

2. Asphalt Driveway and Parking Lot Replacement.

   Asphalt Driveways and Parking Lots shall be replaced equal to that existing prior to construction and shall consist of no less than 2 inches of surface course conforming to the Kentucky Department of Transportation Standard Specifications.

3. Crushed Stone Roadway Replacement or Driveway Replacement

   Crushed Stone Roadways and Pavement shall be replaced to that existing prior to construction but in no case less than 6 inches in depth.

5.4 Dust Control

From time that backfilling is complete until time permanent pavement surface is replaced or, in absence of pavement replacement, until the job is accepted, Contractor shall, at direction of Engineer, water streets, roads, etc. to settle dust where excessive dust has, in opinion of Engineer, been caused by Contractor's operations. If Contractor refuses or delays unnecessarily to obey direction of Engineer, the Owner shall, after 24 hours written notice through engineer, be permitted to proceed with such work with cost to be billed to Contractor.

5.5 Sodding or Sprigging

Where shown on the Drawings or directed by engineer, contractor shall install grass sod or sprigs in lieu of seeding in order to establish ground cover. Normally this would be done in steep areas or areas otherwise subject to erosion.

Such sodding or sprigging when authorized by the engineer as a necessary part of the work and not elected to be used by the Contractor in lieu of seeding shall be a separate pay item if identified separately on the Bid Form.

Prior to sodding or sprigging, soil shall be properly prepared and fertilized. The top 3" of soil shall be pulverized to remove roots, sticks, etc. and smooth the surface. The area shall be fertilized at a minimum rate of 500 pounds per acre. Fertilizer shall be mixed into the top 3" of soil by raking, disking, or other acceptable method. Do not over fertilize areas in order to avoid damaging growth. Fertilizer shall be "Vertigreen", "Vigaro", or approved equal. It shall contain not less than 10% nitrogen, 10% phosphorus, and 10% potash. If the area soil requires adjustment of the pH for proper growth of ground cover, ground limestone shall be applied to bring the pH into the proper range.

Sod shall be at least 8" wide and 12" long with at least 3" of dirt on the roots. The variety of grass shall be suitable to the growing conditions of the area, and compatible with the adjacent grasses. It shall be placed on the prepared surfaces with edges in close contact and, as much as is practicable, in a position to break joints. Each section shall be pounded into place with wooden tamps or other approved implements. Sod shall be maintained moist from the time of its removal until reset and shall be reset as soon as practicable after removal. Immediately after placing, it shall be rolled or hand tamped to the satisfaction of the Engineer. On steep slopes pinning or pegging will be required to hold the sod in place.

Sprigs shall be placed in a random manner at spacing suitable for optimum growth and cover as recommended by the supplier.

Immediately prior to sodding or sprigging, the area shall be sprinkled until saturated to at least 1" depth and kept moist until sodding or sprigging is completed. Sprigs or sod shall be watered as required after setting (normally through a 14-day period). Contractor shall not allow any equipment or material on any planted area and shall erect barricades and guards if necessary to prevent his equipment, labor or the public from traveling on any planted area until satisfactory growth is established.

6.0 SPECIAL CONSTRUCTION ITEMS

6.1 Roadway Crossings

Roads, streets or highways will be crossed at locations and in the manner as designated by the Drawings. State Highway crossings will be subject to the requirements of the crossing permit obtained from the Kentucky Transportation Cabinet.

When working in or near lines of traffic, the Contractor shall provide warning signals or flag men as required by Kentucky Transportation cabinet and the Manual of Uniform Traffic Control Devices.

6.2 Sinkholes

When excavating within an area draining to a sinkhole, special precautions shall be required to avoid excessive silt runoff or debris entering the sinkhole. In such areas, the excavation shall be closed as quickly as possible and the surface restored and mulched to avoid erosion. In the immediate vicinity of sinkholes and when ordered by the Engineer, special erosion control measures as specified in Section 6.3 are to be used.

6.3 Slope Protection and Erosion Control

This section shall consist of temporary control measures as shown in the Drawings or directed by the Engineer or as required by the State of Kentucky - Water Pollution Control Division during the life of the contract to control erosion and water pollution through the use of silt fences, hay bales and other control devices.

a. Baled hay or straw erosion checks are temporary measures to control erosion and prevent siltation. Bales shall be either hay or straw containing five (5) cubic feet or more of natural material.

b. Baled hay or straw erosion checks - hay or straw erosion checks shall be embedded in the ground 4 to 6 inches to prevent water flowing under them. These bales shall be anchored securely to the ground by wooden stakes driven through the bales into the ground. Bales may remain in place after construction, or be removed after they have served their purpose, as determined by the Engineer. The Contractor shall keep the checks in good condition by replacing broken or damaged bales immediately after damage occurs. Normal debris and sediment clear-out will be considered routine maintenance to be performed by the contractor as needed.

c. Temporary silt fences - Silt fences utilizing posts, filter cloth (burlap or plastic filter fabric, etc.) or other approved materials are temporary measures to erosion control. These fences shall be installed to retain suspended silt particles in the run-off-water where directed by the Engineer.

d. The temporary erosion control features installed by the Contractor shall be acceptably maintained by the Contractor until no longer needed or permanent erosion control methods are installed. Any materials removed shall become the property of the Contractor.

e. Erosion control outside project area - Temporary pollution control measures shall include construction work outside the project area where such work is necessary as a result of construction such as borrow pit operations, haul roads and equipment storage sited. Bid price in

such cases shall include all necessary clearing and grubbing, construction incidentals, maintenance, and site restoration when no longer needed.

f. No separate measurement and payment will be made for this work. It will be considered a subsidiary obligation of the Contractor under other bid items.

END OF SECTION 02-300

SECTION 03-100

CONCRETE FORMWORK

1.0 GENERAL

1.01 WORK INCLUDED

A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.

B. Openings for other affected work.

C. Form accessories.

D. Stripping forms.

1.02 RELATED WORK

A. Section 03-210: Reinforcing Steel.

C. Section 03-310: Structural Concrete.

1.03 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 347 - Recommended Practice for Concrete Formwork.

C. PS 1 - Construction and Industrial Plywood.

D. ACI 318 - Building Code Requirements for Reinforced Concrete.

E. ACI 350 R - Environmental Engineering Concrete Structures.

1.04 SYSTEM DESCRIPTION

Design, engineer and construct formwork, shoring, and bracing to meet design and code requirements so that resultant concrete conforms to required shapes, lines, dimensions and tolerances.

1.05 QUALITY ASSURANCE

Construct and erect concrete formwork in accordance with ACI 301 and 347, latest revisions.

2.0 PRODUCTS

2.01 FORM MATERIALS

A. Plywood; Douglas Fir species; medium density overlaid one side grade; sound, undamaged sheets with straight edges.

B. Glass fiber fabric reinforced plastic forms; matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.

C. Forms shall be sufficiently rigid to prevent displacement or sagging between supports and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

D. For surfaces to be given a rubbed finish, the form surface in contact with the concrete shall be made of heavy gage metal, new plywood (used plywood may not be used), tempered wood fiberboards with smooth surface, or similar material. Metal forms or form linings shall have square edges so that the concrete will not have fins or fluting. Forms shall not be pieced out by use of material different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.

E. For surfaces other than those to be given a rubbed finish, forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonably good as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16-inch.

F. Forms for walls, columns, or piers shall have removable panels at the bottom for cleaning, inspection, and scrubbing in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.

G. Forms for exposed surfaces shall be built with 3/4-inch chamfer strips attached to produce smooth, straight chamfers at all sharp edges of concrete.

H. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.

I. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged places repaired, and all projecting nails withdrawn.

2.02 FORMWORK ACCESSORIES

A. Form ties to be encased in concrete shall not be made of through bolts or common wire, but shall be made and installed as to embody the following features:
   1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 inch to the face of the concrete.
   2. That part of the tie which is to be removed shall be at least 1/2-inch in diameter, or if smaller, it shall be provided with a wood or metal cone 1 inch long placed against the inside of the forms. Cones shall be carefully removed from the concrete after the forms have been stripped.
   3. Ties that pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.

B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete. Form oil shall be placed prior to reinforcing steel when possible and surplus oil on form surfaces or reinforcing steel shall be removed.

C. Fillets for Chamfered Corners: Wood strip type to the size and shape as shown on the Drawings (or 3/4-inch if not shown).

D. Dovetail Anchor Slots: Minimum 10 gage thick galvanized steel; foam filled; release tape sealed slots; bent tab anchors securable to concrete formwork.

E. Nails, spikes, lag bolts, through bolts, anchorages: Sized as required of strength and character to maintain formwork in place while placing concrete.

3.0 EXECUTION

3.01 INSPECTION

Verify lines, levels and measurements before proceeding with formwork.

3.02 PREPARATION

Earth forms not permitted except for continuous strip footings of buildings.

3.03 ERECTION

A. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.

B. Camber slabs and beams to achieve ACI 301 tolerances.

C. Provide temporary ports in formwork to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

D. Concrete surfaces not exposed to view shall be formed with sound tight lumber or other material producing equivalent finish.

E. Concrete surfaces to be exposed to view shall be formed with material that is not reactive with concrete surfaces and shall be equivalent in smoothness and appearance to that produced by new plywood panels conforming to PS 1, exterior type Grade B-B.

3.04 APPLICATION OF RELEASE AGENT

Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for work embedded in or passing through concrete.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.06 FORM REMOVAL

A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and construction and design loads which may be imposed upon it. Remove load-supporting forms when concrete has attained 75 percent of required 28-day compressive strength, provided construction is reshored.

B. Reshore structural members due to design requirements or construction conditions to permit successive construction.

C. Remove formwork progressively so that no unbalanced loads are imposed on structure.

D. Do not damage concrete surfaces during form removal.

3.07 CLEANING

A. Clean forms to remove foreign matter as erection proceeds.

B. Ensure that water and debris drain to exterior through clean out ports.

C. During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

END OF SECTION 03-100

SECTION 03-210

REINFORCING STEEL

1.0 GENERAL

1.01 WORK INCLUDED

A. Reinforcing steel.

B. Shop Drawings.

1.02 RELATED WORK

A. Section 03-100: Concrete Formwork.

B. Section 03-310: Structural Concrete.

1.03 REFERENCES

A. ASTM A-615.

B. ASTM A-616.

C. ASTMA-617.

D. ACI 351.

E. ASTM A-120.

F. ASTMA-185.

1.04 SUBMITTALS

A. Shop Drawings: The Contractor shall submit a complete set of shop drawings including schedules and bending drawings for all reinforcement used in the work in accordance with the "Manual of Standard Practice for Detailing Concrete Structures" (ACI 351).

B. Submittals: The Contractor shall submit the shop drawings in accordance with Section 01-300.

1.05 SUPPLEMENTAL UNIT PRICE

The CONTRACTOR shall fill in a unit price for "Reinforcing" in the blank space provided in the Bid to apply in the event of any deletions from or additions to the work. All reinforcement shown or specified shall be included in the Lump Sum bid. The unit prices shall include all elements of work specified in this section.

2.0 PRODUCTS

2.01 MATERIALS

A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A-615, A-616, or A-617. All bar reinforcement shall be deformed.

B. Smooth dowels shall be plain steel bars conforming to ASTM A-615, Grade 40, or steel pipe conforming to ASTM A-120, Schedule 80. Pipe, if used, shall be closed flush at each end with

mortar or metal or plastic cap.

C. Welded wire fabric shall conform to ASTM 185, welded steel wire fabric for concrete reinforcement.

D. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall have approved high density polyethylene tips so that the metal portion shall be at least 1/4-inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks.

2.02 FABRICATION

A. Reinforcement shall be bent cold. It shall be bent accurately to the dimensions and shapes shown on the plans and to within tolerances specified in the CR51 Manual of Standard Practice.

B. Reinforcing shall be shipped with bars of the same size and shape, fastened securely with wire and with metal identification tags giving size and mark.

3.0 EXECUTION

3.01 PLACING AND FASTENING

A. Before being placed in position, reinforcement shall be cleaned of loose mill and rust scale, dirt and other coatings that will interfere with development of proper bond.

B. Reinforcement shall be accurately placed in positions shown on the Drawings and firmly held in place during placement and hardening of concrete by using annealed wire ties. Bars shall be tied at all intersections except where spacing is less than 1 foot in both directions, and then alternate intersections may be tied.

C. Distance from the forms shall be maintained by means of stays, blocks, ties, hangers or other approved supports. If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.

D. **Before any concrete is placed, the Engineer shall have inspected the placing of the steel reinforcement and given permission to deposit the concrete. Concrete placed in violation of this provision will be rejected and thereupon shall be removed.**

E. Unless otherwise specified, reinforcement shall be furnished in the full lengths indicated on the Drawings. Splicing of bars, except where shown on the Drawings, will not be permitted without the approval of the Engineer. Where splices are made, they shall be staggered insofar as possible.

F. Wire mesh reinforcement shall be continuous between expansion joints. Laps shall be at least one full mesh plus 2 inches, staggered to avoid continuous lap in either direction and securely wired or clipped with standard clips.

G. Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased and have a plastic expansion end cap.

END OF SECTION 03-210

SECTION 03-310

CAST-IN-PLACE STRUCTURAL CONCRETE

1.0 GENERAL

1.1 WORK INCLUDED

The work in this section shall include all formwork, shoring, bracing, anchorage, concrete reinforcement and accessories for cast-in-place concrete.

1.2 GENERAL REQUIREMENT

All concrete construction shall conform to all applicable requirements of ACI 301, ACI 318 and ACI 350 R, except as modified by the supplemental requirements specified herein.

1.3 RELATED WORK

A. Section 02-222: Excavation.

B. Section 03-100: Concrete Formwork.

C. Section 03-210: Reinforcing Steel.

1.4 REFERENCES

A. The Contractor shall conform to the recommendations of the following references:
1. Specifications for Structural Concrete for Building ACI 301 (latest revision).
2. Field Reference Manual: Specifications for Structural Concrete for Buildings ACI Sp-15 (88).
3. Manual of Standard Practice - CRSI (latest revision).
4. Placing Reinforcing Bars - CRSI (latest revision).
5. Building Code Requirements for Reinforced Concrete ACI 318.
6. Environmental Engineering Concrete Structures ACI 350R.

B. The following standard shall also apply to this work:
1. ASTMC-143.
2. ASTM C-150.
3. ASTMC-33.
4. ASTM C-260.
5. ASTM C-494.
6. ASTM A-615.
7. ASTM D-638.
8. ASTM D-695.
9. ASTM D-570.
10. ASTM D-1252.
11. ASNI A-116.1.
12. ASTM A-120.
13. ASTM C-94.
14. ASTM D-2146.
15. Federal Specifications FF-S-325.

1.5 SUBMITTALS

A. The Contractor shall submit the following data to the Engineer for review:
1. Proposed mix designs, test results, plotted curves and all other substantiating data as required by Sections 3.8 and 3.9 of ACI 301.
2. Mix designs for all mixes proposed or required to be used, including all mixes containing admixtures.
3. A certified copy of the control records of the proposed production facility establishing the standard deviation as defined in Section 3.9 of ACI 301.

B. Certification attesting that admixtures equal or exceeds the physical requirements of ASTM C-494 for Type A admixture and when required, for Type D admixture.

C. Notarized certifications by the manufacturer that epoxy bonding adhesive meets the specification

contained herein.

D. Drawings showing locations of all proposed construction joints.

E. Shop drawing for reinforcing steel showing bar schedules, location, and splices.

1.6 QUALITY ASSURANCE

A. Consistency:
1. Concrete shall be of such consistency that it can be worked readily into all parts of the forms and around embedded work, without permitting the materials to segregate, or free water to collect on the surface. Consistency shall be measured by the ASTM Standard Test Method for Slump of Portland Cement Concrete, Designation C143-78. The consistency of concrete shall be as given in Table I.
2. Slump tests shall be made in the field by the Contractor.

B. Compression Tests:
1. During the progress of the work, at least one set of four compression test cylinders shall be made for each 50 cubic yards of concrete or major fraction thereof, and not less than one such set for each type of concrete for each days' pouring. Cylinders made in the field shall be made and cured in accordance with ASTM Standard Method of Making and Curing Concrete Test Specimens in the Field, Designation C31-69, except that wherever possible molds shall be left on cylinders until they have reached the laboratory.
2. One (1) cylinder of each set shall be broken in accordance with ASTM C-39 at seven (7) days and two (2) at twenty-eight (28) days. Two (2) copies of these test results shall be submitted to the Engineer on the same day of the tests. The remaining cylinder shall be reserved for future testing if required.
3. On evidence of these tests, any concrete that fails to meet the specified strength requirements shall be strengthened or replaced as directed by the Engineer at the Contractor's expense.

C. Inserts in Concrete by Other Trades:
1. All trades shall be notified, at the proper time, to install items to be embedded in concrete.
2. All castings, inserts, conduits, and other metalwork shall be accurately built into or encased in the concrete by the Contractor as directed and all necessary precautions shall be taken to prevent the metalwork from being displaced or deformed.
3. Anchor bolts shall be set by means of substantial templates.
4. The Contractor shall build into new concrete against which facing brick or tile is to be laid, suitable, acceptable, non-corrodible metal, dovetail grooves for ties for securing the brickwork to the concrete.

D. Testing:
1. All testing shall be in accordance with provisions of ACI 301.
2. Testing services listed in ACI 301 Sections 16.3, 16.4 and 16.5 shall be performed by a testing agency acceptable to the Engineer. Testing services to meet the requirements of ACI shall be paid for by the Contractor at his expense. Test shall be made for each 50 cubic yards of concrete and/or each day concrete is placed.

E. Additional Requirements:
1. Unless otherwise directed by the Engineer, the vertical surfaces of all footings shall be formed. Excavations and reinforcement for all footings shall have been inspected by the Engineer before any concrete is placed.
2. The installation of underground and embedded items shall be inspected before slabs are placed. Pipes and conduits shall be installed below the concrete unless otherwise indicated. Fill required to raise the subgrade shall be placed as specified in Division 2. Unless shown otherwise, porous fill not less than 6 inches in compacted thickness shall be installed under all slabs, tank bottoms, and foundations. The fill shall be leveled and uniformly compacted to a reasonably true and even surface. The surfaces shall be clean,

free from frost, ice, mud and water. Where indicated, waterproof paper, polyethylene sheeting of nominal 4-mill minimum thickness, or polyethylene coated burlap shall be laid over surfaces receiving concrete.

F. Hot Weather Requirements: Placing of concrete under conditions of high temperatures, low humidity or wind shall be done in accordance with the American Concrete Institute "Hot Weather Concreting" (ACI 305R-77).

G. Cold Weather Requirements: Cold weather concreting procedures and precautions shall conform to American Concrete Institute "Cold Weather Concreting" (ACI 306 R-78).

2.0 PRODUCTS

2.1 Contractor shall supply concrete only from an approved ready mixed concrete supplier.

2.2 CONCRETE MIX WITHOUT FLY ASH

Structural concrete of the various classes required shall be proportioned by Section 3.9 of ACI 301 to produce the following 28-day compressive strengths:

A. Selection of Proportions for Class A Concrete:
1. 4,000 psi compressive for strength at 28 days.
2. Type II cement plus water reducing, dispersing agent and air. Type IP cement may be used in place of Type II.
3. Maximum water/cement plus water reducing dispersing agent ratio = 0.50.
4. Minimum cement content = 564 pounds (6.0 bags)/cubic yards concrete.
5. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
6. Air content = 6 percent plus or minus 2 percent by volume.
7. Slump = 2 inches to 3 inches in accordance with ASTM C-143.

B. Selection of proportions for Class B concrete:
1. 3,000 psi compressive strength at 28 days.
2. Type I cement plus water reducing dispersing agent and air.
3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.56.
4. Minimum cement content = 432 pounds (4.5 bags)/cubic yards concrete.
5. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
6. Air content = 6 percent plus or minus 2 percent by volume.
7. Slump = 3 inches to 4 inches in accordance with ASTM C-143.

2.3 OPTIONAL CONCRETE MIX USING FLY ASH

A. Selection of Proportions for Class A Concrete:
1. 4,000 psi compressive for strength at 28 days.
2. Type II cement plus water reducing dispersing agent and air.
3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.50.
4. Minimum cement content = 517 pounds (5.5 bags)/cubic yards concrete.
5. Maximum Fly Ash Content = 71 pounds/cubic yards
6. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
7. Air content = 6 percent plus or minus 2 percent by volume.
8. Slump = 2 inches to 3 inches in accordance with ASTM C-143.

B. Selection of Proportions for Class B Concrete:
1. 3,000 psi compressive strength at 28 days.
2. Type I cement plus water reducing dispersing agent and air.
3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.56.
4. Minimum cement content = 432 pounds (4.5 bags)/cubic yards concrete.

5. Maximum Fly Ash Content = 71 pounds/cubic yards.
6. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
7. Air content = 6 percent plus or minus 2 percent by volume.
8. Slump = 3 inches to 4 inches in accordance with ASTM C-143.

C. Applicable Standards:
1. ANSI C 311-77 "Standard Methods of Sampling and Testing Fly Ash for Use as an Admixture in Portland Cement Concrete".
2. ANSI C 618-80 "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete".

D. Concrete shall be used as follows:
1. Class A concrete for all concrete work except as noted below.
2. Class B concrete for fill concrete, thrust blocks, post setting, and where indicated on the Drawings.

E. All testing shall be or have been performed by an approved independent testing laboratory.

F. Cement for exposed concrete shall have a uniform color classification.

G. Type II cement conforming to ASTM C-150 shall be used in all structural concrete. The alkali content shall not exceed 0.6 percent calculated as sodium oxide. Type IP Cement may be used in place of Type II cement.

H. Coarse aggregate shall conform to all requirements of ASTM C-33.

I. Manufactured sand shall not be used as fine aggregate in concrete.

2.4 FLY ASH CONCRETE

A. In the absence of a verified and acceptable history of fly ash concrete mixes, the following procedure is required to establish the quality of the concrete mix.

B. Trial batches must be made starting thirty (30) days ahead of initial concrete pour. Four (4) mixes shall be designed and produced at no cost to the Owner or the Engineer as follows:
1. Mix using Type II cement with water reducing admixture for normal temperatures (Class A).
2. Mix using Type II cement with water reducing admixture for cold weather temperatures (Class A).
3. Mix using Type II cement with water reducing admixture for hot weather temperatures (Class A).
4. Mix using Type I cement with water reducing admixture for normal weather temperatures (Class B).

C. Four (4) test cylinders shall be cast for each of the four (4) mixes. Two (2) cylinders shall be broken at 7 days, and two (2) cylinders shall be broken at 28 days, for each of the four (4) mixes. The trial batch design report shall include strength breaks at 7 days and 28 days, air content, etc.

D. The water-reducing, cement dispersing admixture (such as Master Builders Pozzolith 344-N, Nox-Crete Plastiflow, Plastocrete 161 by SIKA Chemical Company, or approved equal) used in fly ash concrete, shall be a normal, accelerated, or retarded hardening admixture. The admixture shall be used at optimum dosage to offset the slow strength development and setting characteristics of the fly ash. Only those brands of admixture that can provide readily available field service on short notice to provide field services, inspection, and assistance, will be acceptable.

E. Prior to the use of fly ash concrete, recent mill reports shall be submitted on a regular basis during the project. Maximum loss of ignition (LOI) shall be 6 percent.

F. Tests for air content shall be made twice a day at the jobsite prior to pouring, for all mixes containing fly ash.

2.5 ADMIXTURES

A. An air-entraining admixture shall be used on all concrete and shall be the neutralized vinsol resin type such as Master Builders MB-VR, or Euclid Chemical Co. AIR-MIX or equal. The admixture shall meet the requirements of ASTM C-260. Certification attesting to the percent of effective solids and compliance of the material with ASTM C-260 shall be furnished, if requested.

B. A water reducing, set-controlling admixture (non-lignin type) shall be used in all concrete. The admixture shall be a combination of polyhydroxylated polymers including catalysts and components to produce the required setting time based on job site conditions, specified early strength development, finishing characteristics required, and surface texture, as determined by the Engineer.

C. Certification shall be furnished attesting that the admixture exceeds the physical requirements of ASTM C-494, Type A, water reducing and normal setting admixture, and when required, for ASTM C-494, Type D, water reducing and retarding admixture when used with local materials with which the subject concrete is composed.

D. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He also will be available when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

E. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met.

F. The admixture shall conform to ASTM C-494 except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C-494.

G. Where the Contractor finds it impractical to employ fully the recommended procedures for hot weather concreting, the Engineer may at his discretion require the use of a set retardant admixture for mass concrete greater than 2.5 feet thick and for all concrete whenever the temperature at the time concrete is cast exceeds 80 degrees F. The Contractor subject to the review of the Engineer shall select the admixture. The admixture and concrete containing the admixture shall meet all the requirements of these Specifications. Preliminary tests of this concrete shall be required at the Contractor's expense.

H. Admixtures shall be used in concrete design mixes in the same manner and proportions as in the field so that the effects of the admixtures are included in preliminary tests submitted to the Engineer for review prior to the start of construction.

I. When more than one admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.

J. Calcium chloride will not be permitted as an admixture in any concrete.

2.6 WATER

The mix water for concrete shall be potable.

2.7 AGGREGATES

A. Fine aggregates shall be natural sand having clean, hard, uncoated grains, free from injurious amounts of clay, dust, organic matter or other deleterious substances, and shall conform to ASTM C-33.

B. Coarse aggregates shall be crushed stone having clean, hard, uncoated particles, and shall be free from injurious amounts of soft, friable, thin, elongated or laminated pieces. Shale may not be used as aggregate. Coarse aggregates shall conform to ASTM C-33 and shall not exceed the following maximum sizes:
   1. 3/4-inch for slabs, beams, girders, and walls.
   2. 1-inch for all other concrete.

2.8 TESTING AGGREGATES AND DETERMINING PROPORTIONS

A. No concrete shall be used in the work until the Engineer has accepted the materials and mix design.

B. The conformity of aggregates to the specifications hereinbefore given shall be demonstrated and determined by tests per ASTM C-33 made with representative samples of the materials to be used on the work.

C. The actual proportions of cement, aggregates, admixtures and water necessary to produce concrete conforming to the requirements set forth shall be determined by making test cylinders using representative samples of the materials to be used in the work. A set of four (4) standard 6-inch cylinders shall be made and cured per ASTM C-31. Two (2) shall be tested at 7 days and two (2) at 28 days per ASTM C-39. The slump shall not be less than the greatest slump expected to be used in the work.

D. Reports on the tests and a statement of the proportions proposed for the concrete mixture, shall be submitted in triplicate to the Engineer for review as soon as possible, but not less than five (5) days prior to the proposed beginning of the concrete work. If the Contractor furnishes in writing, similar, reliable detailed information from an acceptable source, and of date not more than four (4) months prior to the time when concrete will be used on this project, the above requirements for laboratory tests may be modified by the Engineer. Such data shall derive from mixtures containing constituents, including the admixtures where used, of the same types and from the same sources as will be used on this project.

E. The Engineer shall have the right to make check tests of aggregates and concrete, using the same materials, and to order changes as may be necessary to meet the specified requirements.

F. The Contractor may request permission to add water at the job site, and when the addition of water is permitted by the Engineer, the quantity added shall be the responsibility of the Contractor and in no case shall the total water per bag of cement exceed that determined by the designed mix.

G. All concrete exposed to weather, such as foundations, walls, exterior steps and retaining walls, etc. shall be air entrained.

H. If concrete of the required characteristics is not being produced as the work progresses, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure concrete of the specified quality. The Contractor shall make such changes at his own expense and no extra compensation will be allowed because of such changes.

2.9 MIXING

All central plant and rolling stock equipment and methods shall conform to the Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready Mixed Concrete Assn., as well as the ACI Standards for Measuring, Mixing and Placing Concrete (ACI 614), and with Sections 7 to 14,

inclusive, of the ASTM Standard Specification for Ready Mixed Concrete, Designation C94-78a, insofar as applicable.

3.0 EXECUTION

3.1 PLACING AND COMPACTING CONCRETE

A. At least 20 hours before the Contractor proposes to make any placement of concrete, he shall notify the Engineer of his intention and planned procedure. Unless otherwise permitted, the work shall be so executed that a section begun on any day shall be completed during daylight of the same day.

B. Ready mixed concrete shall be transported to the site in watertight agitator or mixer trucks. The quantity of concrete to be mixed or delivered in any one batch shall not exceed the rated capacity of the mixer or agitator for the respective conditions as stated on the nameplates.

C. Central mixed concrete shall be plant mixed a minimum of 1-1/2 minutes per batch, and then shall be truck mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the premixed concrete is placed in the truck and shall continue without interruption until discharge. For transit mixed concrete, the major portion of the mixing water shall be added and mixing started immediately after the truck is charged.

D. The amount of water initially added shall be recorded on the delivery slip for the Engineer's information; no additional water shall be added, either in transit or at the site, except as directed. Mixing (at mixing speed) shall be continued for at least 10 minutes followed by agitation without interruption until discharge. Concrete shall be discharged at the site within 1-1/2 hours after water was first added to the mix, and shall be mixed at least 5 minutes after all water has been added.

E. Concrete that has become compacted or segregated during transportation to or on the site of the work shall be satisfactorily remixed just prior to being placed in the forms.

F. Partially hardened concrete shall not be deposited in the forms. The retempering of concrete which has partially hardened (that is, the remixing of concrete with or without additional cement, aggregate, or water) will not be permitted.

G. The concrete shall be mixed only in the quantity required for immediate use. Concrete that has developed an initial set shall not be used. The Contractor shall have sufficient plant capacity and transporting apparatus to insure continuous delivery at the rate required.

H. The temperature of the concrete mixture immediately before placement shall be between 50 degrees F and 90 degrees F.

I. Concrete mixed in stationary mixers and transported by nonagitating equipment shall be placed in the forms within 45 minutes from the time ingredients are charged into the mixing drum. Concrete that is truck mixed or transported in truck mixers or truck agitators shall be delivered to the site of the work and discharge completed in the forms within the time specified in paragraph 10.7 of ASTM C-94, except that when the concrete temperature exceeds 85 degrees F, the time shall be reduced to 30 minutes. Transmit mixed concrete that is completely mixed at the site of concrete placement or batched cement and aggregates transported to mixers shall be placed in the forms within 1-1/2 hours after cement has been added. Concrete shall be placed in the forms within 15 minutes after discharge from the mixer at the job site.

J. If concrete is placed by pumping, no aluminum shall be used in any parts of the pumping system that contact or might contaminate the concrete. Aluminum chutes and conveyors shall not be used.

K. No concrete shall be placed on frozen subgrade or in water, or until the subgrade, forms, and preliminary work have been accepted. No concrete shall be placed until all materials to be built into the concrete have been set and have been accepted by the various trades and by the

Engineer. All such materials shall be thoroughly clean and free from rust, scale, oil, or any other foreign matter.

L. Forms and excavations shall be free from water and all dirt, debris, and foreign matter when concrete is placed. Except as otherwise directed, wood forms and embedded wood called for or allowed shall be thoroughly wetted just prior to placement of concrete.

M. Concrete placed at air temperatures below 40 degrees F shall have a minimum temperature of 50 degrees F and a maximum of 70 degrees F when placed.

N. Chutes for conveying concrete shall be metal or metal lined and of such size, design, and slope as to ensure a continuous flow of concrete without segregation. The slope of chutes shall have approximately the same slope. The discharge end of the chute shall be provided with a baffle, or if required, a spout and the end of the chute. The spout shall be kept as close as practicable to, but in no event more than 5 feet above the surface of the fresh concrete. When the operation is intermittent, the chute shall discharge into a hopper.

O. In thin sections of considerable height (such as walls and columns), concrete shall be placed in such manner as will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the mass of concrete being placed. To achieve this end, suitable hoppers spouts with restricted outlets, etc. shall be used as required or permitted unless the forms are provided with suitable openings.

P. Chutes, hoppers, spouts, etc. shall be thoroughly cleaned before and after each run and the water and debris shall not be discharged inside the form.

Q. For any one placement, concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section, and so as to maintain until the completion of the unit, an approximately horizontal plastic surface.

R. No wooden spreaders shall be left in the concrete.

S. During and immediately after being deposited, concrete shall be thoroughly compacted by means of suitable tools and methods, such as internal type mechanical vibrators operating at not less than 5,000 rpm or other tool spading to produce the required density and quality of finish. Vibration shall be done only by experienced operators and shall be carried in such manner and only long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents, "pumping" of air, or other objectionable results.

T. The concrete shall be thoroughly rodded and tamped about embedded materials so as to secure proper adhesion and prevent leakage. Care shall be taken to prevent the displacement of such materials during concreting.

U. The distance between construction joints shall not exceed 25 feet for all concrete construction and not less than 48 hours shall elapse between casting of adjoining units unless the Engineer waives these requirements. Provision shall be made for jointing successive units as indicated or required. Where joints are not shown on the Drawings, they are required to be made at a spacing of approximately 25 feet. Additional construction joints required to satisfy the 25 foot spacing requirement shall be located by the Contractor subject to the review of the Engineer. The Contractor shall submit for review Drawings separate from the steel reinforcing Drawings, showing the location of all proposed construction joints. All construction joints shall be prepared for bonding as specified in paragraph 6.1.4.3 of ACI Standard 301 and Section 3.02 Bonding Concrete at Construction Joints. Joints in walls and columns shall be maintained level.

V. Formwork for beam soffits and slabs and other parts that support the weight of concrete shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.

3.2 BONDING CONCRETE AT CONSTRUCTION JOINTS

A. In order to secure full bond at construction joints, the surface of the concrete previously placed (including vertical, inclined, and substantially horizontal areas) shall be thoroughly cleaned of foreign materials and laitance, if any, and then roughened.

B. The previously placed concrete at the joint shall be free of standing water.

C. Waterstops shall be used on all construction joints below water level.

3.3 CURING AND PROTECTION

A. All concrete, particularly slabs and including finished surfaces, shall be treated immediately after concreting or cement finishing is completed, to provide continuous moist curing for at least seven days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or kept moist by other acceptable means. Horizontal surfaces, slabs, etc., shall be ponded to a depth of 1/2-inch wherever practicable, or kept continuously wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other acceptable means.

B. For at least seven days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 45 degrees F. The methods of protecting the concrete shall be as specified in that section of the General Specifications titled "Precautions During Adverse Weather" and shall be subject to the review of the Engineer.

C. The above-mentioned 7-day periods may be reduced to 3 days in each case if high-early-strength cement is allowed to be used in the concrete.

D. Wherever practicable, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

3.4 TRIMMING AND REPAIRS

A. The Contractor shall use suitable forms, mixture of concrete, and workmanship so that concrete surfaces, when exposed, will not require patching. Concrete which, in the opinion of the Engineer has excessive honeycomb, aggregate pockets, or depressions will be rejected and the Contractor shall, at his own expense remove the entire section containing such defects and replace it with acceptable concrete.

B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled and surface defects which do not impair structural strength shall be repaired.

C. Defective concrete shall be cut perpendicular to the surface until sound concrete is reached, but not less than 1-inch deep. The remaining concrete shall be thoroughly roughened and cleaned. Concrete around the cavity or the form tie recess shall be thoroughly wetted and promptly painted with a 1/16-inch brush coat of neat cement mixed to the consistency of thick paint. The hole shall then be filled with mortar.

D. Mortar shall be 1:1-1/2 cement and sand mix with sufficient white cement, or fine limestone screening in lieu of sand, to produce a surface matching the adjoining work. Cement and sand shall be from the same sources as in the parent concrete.

E. Mortar in patches shall be applied so that after partial set it can be compressed and rubbed to produce a finish flush and uniform in texture with the adjoining work. All patches shall be warm-moist cured as above specified.

F. The use of mortar patching as above specified shall be confined to the repair of small defects in relatively green concrete. If substantial repairs are required, the defective portions shall be cut out

to sound concrete and the defective concrete replaced by means of a cement gun, or the structure shall be taken down and rebuilt, all as the Engineer may decide or direct.

3.5 FINISHES

A. Exposed to View Concrete Surfaces:

1. All concrete exposed to view in the completed structure shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of paragraphs 13.3, 13.4, and 13.6 of ACI shall apply to all exposed to view concrete surfaces (limited to 1 foot below grade and 1 foot below the minimum liquid level for structures that will contain liquids).
2. Forms for exposed concrete surfaces shall be exterior grade, high density overlay plywood, steel, or wood forms with smooth tempered hard board form liners.
3. Forms shall be coated with Nox-Crete Form Coating Release Agent, Debond Form Coating by L & M Construction Chemicals, Inc. or an approved equal, before initial pour and between subsequent pours, in accordance with the manufacturer's printed instructions. Form boards shall not be wet with water prior to placing concrete.
4. Recessed joints in concrete shall be formed using lacquer coated wooden battens or forms, milled to indicated profiles. Battens and corner strips shall be carefully inspected before concrete is placed and damaged pieces replaced.
5. Chamfer strips shall be 1-inch radius with leg, polyvinyl chloride strips by Gateway Building Products, Saf-T-Grip Specialties Cor., Vinylex Corp., or equal.
6. Particular attention is directed to the requirements of paragraphs 10.2.2 and 13.3 of ACI 301. Form panels shall be provided in the maximum form joints. Wherever practicable, form joints shall occur at recessed joints. All form joints in exterior exposed to view surfaces shall be carefully caulked with an approved nonstaining caulking compound. Joints shall not be taped. Form oil or other material that will impart a stain to the concrete shall not be allowed to contact concrete surfaces.
7. Care shall be taken to prevent chipping of corners or other damage to concrete when forms are removed. Exposed corners and other surfaces that may be damaged by ensuing operations shall be protected from damage by boxing, corner boards or other approved means until construction is completed.
8. Form ties shall remain in the walls and shall be equipped with a waterseal to prevent passage of water through the walls. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends to tie wires project toward or touch formwork. Minimum set back of form ties shall be 1 inch from faces of wall. The hole left by removal of tie ends shall be sealed and grouted as per ACI Par. 9.3 and in accordance with procedure described hereinafter in Par. 3.04.E. Form ties will be permitted to fall within as cast areas of architecturally treated wall surfaces (ACI Chapter 13); this does not apply to walls receiving textured decorative waterproof masonry coating.
9. All formed exposed to view concrete shall be prepared as paragraph 3.04 B, then rubbed and coated with Thoroseal or another Engineer approved product. The manufacturer's recommendations for surface preparation, application procedures and rates, and temperature and moisture conditions shall be followed. Exterior vertical surfaces shall be finished to one foot below grade. Interior exposed to view vertical surfaces of dry pits shall be finished full height, interior vertical surfaces of liquid containers shall be finished to one foot below the minimum liquid level that will occur during normal operations.
10. Slope all slabs to prevent water pocketing.

B. All vertical surfaces below minimum liquid level in liquid containing structures shall have a smooth form finish.

C. All smooth form concrete vertical surfaces shall be true plane within 1/4-inch in 10 feet as determined by a 10 foot straight edge place anywhere on the surface in any direction. Abrupt irregularities shall not exceed 1/8-inch.

D. Basin and tank floors shall have a "troweled" finish unless shown otherwise on Drawings.

E. Weirs and overflow surfaces shall be given a troweled finish.

F. Exterior platforms, steps and landings shall be given a broom finish. Broom finish shall be applied to surfaces which have been steel troweled to an even smooth finish. The troweled surface shall then be broomed with a fiber bristle brush in the direction transverse to that of the main traffic.

G. Walking surfaces of slabs shall have a troweled finish unless shown otherwise on Drawings.

H. Patching of holes due to removal of tie ends and other repairable defective areas shall be as follows: Entire contact area of hole shall be coated with two part moisture insensitive epoxy bonding compound in accordance with manufacturer's specifications, and prior to placing of freshly mixed patching mortar. Patching mortar shall be mixed and placed in general accordance with ACI Par. 9.2.2, 9.2.3, and 13.6.

I. Nox-Crete Harbeton, Chem Hard by L & M Construction Chemicals hardener treatment, or an approved equal shall be applied to all exposed concrete floors in occupied spaces. The floors shall be thoroughly cured, cleaned, and perfectly dry with all work above them completed. The hardener shall be applied evenly and freely and in conformance with manufacturer's instructions, using not less than three (3) coats, allowing 24 hours between coats. One gallon of hardener shall cover not more than 100 square feet. After the final coat is completed and dry, surplus hardener shall be removed from the surface of the concrete by scrubbing and mopping with water.

3.6 CONCRETE WALKS AND CURBS:

A. Subgrade shall be true and well compacted at the required grades. Spongy and otherwise unsuitable material shall have been removed and replaced with properly compacted stone.

B. Concrete walks shall be not less than 4 inches in thickness. Walks shall have contraction joints every 4 linear feet in each direction, formed in the fresh concrete by cutting a groove in the top surface of the slab to a depth of at least one-fourth the slab thickness with a jointing tool. Transverse expansion joints shall be installed at driveways, and opposite expansion joints in adjacent curbs. Where curbs are not adjacent, transverse expansion joints shall be installed at intervals of approximately 24 feet. Sidewalks shall receive a broomed finish. Scoring shall be in a transverse direction. Edges of the sidewalks and joints shall be edged with a tool having a radius not greater than 1/4-inch. Sidewalks adjacent to curbs shall have a slope of 1/4-inch per foot toward the curb. Sidewalks not adjacent to curbs shall have a transverse slope of 1/4-inch per foot or shall be crowned as directed by the Engineer. The surface of the concrete shall show no variation in cross section in excess of 1/4-inch in 5 feet. Concrete walks shall be reinforced with 6 x 6 - W1.4 x W1.4 welded wire fabric unless noted otherwise on the Drawings.

3.7 WATERTIGHTNESS

A. The structures that are intended to contain liquids and/or will be subjected to exterior hydrostatic pressures shall be so constructed that when completed and tested, there shall be no loss of water and no wet spots shall show.

B. As soon as practicable after the completion of the structures, the Contractor shall fill such structures with water and if leakages develop or wet spots show, the Contractor shall empty such structures and correct the leakage in an approved manner. Any cracks that appear in the concrete shall be dug out and suitably repaired. Temporary bulkheads over pipe openings in walls shall be provided as required for the testing.

C. After repairs, if any are required, the structures shall be tested again and further repaired if necessary until satisfactory results are obtained. All work in connection with these tests and repairs shall be at the expense of the Contractor.

D. Waterstops shall be placed in all locations as indicated on the Drawings and as may be required to assure the watertightness of all containers of liquids. Special shop fabricated ells, tees and

crosses shall be provided at junctions. Waterstops shall be extended at least 6 inches beyond end of placement in order to provide splice length for subsequent placement. In slabs and tank bottoms, waterstops shall be turned up to be made continuous with waterstops at bottom of walls or in walls. All joints between adjacent, continuing, and intersecting sections of waterstop including butt joints, tee joints, and other angled joints shall be heat fused to form a watertight seal. Waterstops shall not be lapped. Waterstops shall be secured in place to maintain proper position during placement of concrete. Care shall be taken to avoid folding while concrete is being placed and to prevent voids in the concrete surrounding the waterstop. All materials shall be installed in accordance with the manufacturer's recommendations.

E. Joints between pipe (except cast iron wall pipe) and cast-in-place concrete walls shall be sealed as required by the Drawings.

F. The top surface of all concrete decks (except slabs on grade) shall be coated with Sikagard-70 water-repellant penetrating sealer as manufactured by the Sika Corporation, Nox-Crete Stifel, or another approved equal. The manufacturer's recommendations shall be followed in all areas of application.

3.8 GROUTING BASE PLATES, BEARING PLATES AND MACHINE BASES

A. Column base plates, bearing plates for beams and similar structural members, machinery and equipment bases shall, after being plumbed and properly positioned, be provided with full bearing on epoxy nonshrink grout. Concrete surfaces shall be rough, clean, free of oil, grease and laitance and shall be moistened thoroughly immediately before grout is placed. Metal surfaces shall be clean and free of oil, grease and rust. Mixing and placing shall be in conformance with the material manufacturer's printed instructions.

B. Grout fill that is formed in place by using rotating equipment as a screed, such as for clarifiers and similar types of equipment, shall be mixed in proportions and consistencies as required by the manufacturer or supplier of the equipment.

3.9 EQUIPMENT PADS

Unless otherwise shown or directed, all equipment and items such as lockers, motor control centers, etc., shall be installed on concrete bases. The bases shall be constructed to the dimensions shown on the Drawings or as required to meet plan elevations. Where no specific plan elevations are required, the bases shall be 6 inches thick and shall extend 3 inches outside the equipment base. In general, the concrete bases shall be placed up to 1-inch below the base. The equipment shall then be properly slimmed to grade and the 1-inch void filled with nonshrink epoxy grout.

END OF SECTION 03-310

SECTION 03-320

PRECAST STRUCTURAL CONCRETE

1.0 GENERAL

1.1 WORK INCLUDED

The work in this section shall include all formwork, shoring, bracing, anchorage, concrete reinforcement and accessories for precast concrete.

1.2 GENERAL REQUIREMENT

All concrete construction shall conform to all applicable requirements of ACI 301, ACI 318 and ACI 350 R, except as modified by the supplemental requirements specified herein.

2.0 PRODUCTS

2.1 Contractor shall supply precast concrete from an experienced supplier.

2.2 CONCRETE MIX

Structural concrete shall be proportioned by Section 3.9 of ACI 301 to produce the following 28-day compressive strengths:

A. Selection of Proportions for all precast concrete:
   1. 4,000 psi compressive for strength at 28 days.
   2. Maximum water/cement plus water reducing dispersing agent ratio = 0.50.
   4. Minimum cement content = 564 pounds (6.0 bags)/cubic yards concrete.
   5. Nominal maximum size coarse aggregate = No. 57 (1-inch maximum).
   6. Air content = 6 percent plus or minus 2 percent by volume.
   7. Slump = 2 inches to 3 inches in accordance with ASTM C-143.

2.3 REINFORCING STEEL

A. All reinforcing steel shall conform to ASTM A-615, grade 60.

3.0 EXECUTION

3.1 FORMING

A. All forming shall be with suitable wooden or metal forms to provide the specified shape and finished thickness.

B. Precast concrete shall remain in the forms until it develops sufficient strength to safely withstand handling stresses.

3.2 PLACEMENT AND FINISHING

A. Concrete shall be placed and compacted in the forms with vibrators to remove air pockets. Reinforcing steel and embedments shall be placed in the location shown on the drawings and secured in a way to avoid displacement during concrete placement.

B. Precast concrete shall receive a float finish. Surfaces shall be smooth and uniform.

END OF SECTION 03-320

SECTION 16-010

GENERAL ELECTRICAL REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes general requirements for all electrical work.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ANSI/NFPA 70–National Electric Code.

B. ANSI/IEEE C2.

1.03 CONTRACT DOCUMENTS

A. Any device roughed-in improperly and not positioned on implied centerlines, or as dictated by good practice, must be repositioned at no cost to OWNER.

B. The drawings are generally diagrammatic, and CONTRACTOR shall coordinate the work so that interferences are avoided. Provide all offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.

1.04 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

B. Conform to ANSI/IEEE C2.

C. The rules and regulations of the federal, state, local, civil authorities, and utility companies in force at the time of execution of the Contract shall become a part of this specification.

D. Obtain electrical permits and inspections from authority having jurisdiction. Costs for permits and inspections shall be by CONTRACTOR.

1.05 CODES AND ORDINANCES

A. CONTRACTOR is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. CONTRACTOR shall know or ascertain the rulings and interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by him.

B. In preparing his Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities whether or not these are specifically covered by the drawings and specifications. All cases of serious conflict or omission between the drawings, specifications, and codes shall be brought to ENGINEER's attention as herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances and in such manner as to obtain approval of all authorities whose approval is required.

C. When requested by ENGINEER, CONTRACTOR shall provide written calculations to show compliance with applicable codes or the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction and pull box fill and sizing, conductor derating, and voltage drop.

CONTRACTOR shall indicate calculation method used as well as compliance with applicable code, drawing, or specification.

1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS

A. Included in this Contract are electrical connections to equipment provided under other divisions. CONTRACTOR shall refer to final shop drawings for equipment being furnished under other divisions for exact location of electrical devices and the various connections.

1.07 ELECTRICAL DISTRIBUTION SYSTEM

A. Provide a complete electrical distribution system consisting of components indicated on the drawings or specified herein, including, but not limited to:
   1. Feeders and branch wiring.
   2. All control wiring.
   3. Access panels and access doors for access to equipment installed by Division 16.
   4. Wiring between system components if equipment is not prewired.
   5. Support system design and supports for electrical raceways.
   6. Code required disconnects.

B. CONTRACTOR shall connect equipment provided under other divisions as indicated herein.

C. Provide balancing and adjusting of electrical loads.

D. CONTRACTOR shall instruct OWNER's representative in the operation and maintenance of all equipment. The instruction shall include a complete operating cycle on all apparatus.

E. Provide miscellaneous items for a complete and functioning system as indicated on the drawings and specified herein.

1.08 NOISE

A. Eliminate any abnormal noises which are not considered by ENGINEER to be an inherent part of the systems as designed. Abnormal buzzing in equipment components will not be acceptable.

1.09 DRAWINGS

A. The drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with construction. Locate all the various items by on-the-job measurements in conformance with Contract Documents and cooperation with other trades.

B. The drawings are schematic in nature and are not intended to show exact locations of conduit but rather to indicate distribution, circuitry, and control.

C. In certain instances, electrical equipment or other electrical devices may be relocated. Where relocation is within 10 feet of location shown on the drawings, and when CONTRACTOR is informed of necessary relocation before work is begun on this portion of the job, the relocation shall be at CONTRACTOR'S expense.

1.10 EXISTING UNDERGROUND UTILITIES

A. Record drawings of existing underground electrical utilities are not available for these stations. CONTRACTOR shall excavate and verify the location of all underground electrical prior to installing new electrical equipment. This shall include, but not be limited to, feeders to structures and equipment, branch circuit wiring, phone and communication cabling, instrument wiring, and control wiring. CONTRACTOR shall temporarily relocate existing underground electrical to keep the existing

facility in operation and for any new construction, and all costs for relocating existing electrical shall be included in the Bid.

1.11 SUBMITTALS

A. CONTRACTOR shall submit to ENGINEER for approval prior to beginning his work, shop drawings on the equipment proposed to be furnished and installed. See Division 1-Submittals for requirements.

B. CONTRACTOR shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by ENGINEER for purposes of clarification of CONTRACTOR's intent. CONTRACTOR shall also submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under this section shall include, but not be limited to, electrical interlock wiring diagrams (see Section 16940–Controls and Instrumentation), where applicable to this project:

C. These drawings and diagrams shall show all electrical switch and breaker sizes as well as the manufacturer's name and catalog number of each piece of equipment used.

D. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
   1. Proper sizes and capacities.
   2. Construction materials and finishes.

E. When the manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item. The shop drawings shall be clearly marked and noted accordingly.

F. When equipment and items specified include accessories, parts, and additional items under one designation, shop drawings shall be complete and include all components.

G. See additional requirements of shop drawings under Division 1–General Requirements.

PART 2–PRODUCTS

2.01 STANDARD PRODUCTS

A. All equipment shall be UL-listed and NEMA-approved.

B. All equipment and wiring shall be selected and installed for conditions in which it will perform; e.g., general purpose, weatherproof, raintight, explosionproof, dusttight, or any other special type.

2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. While it is not the intention of OWNER to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. CONTRACTOR shall submit with each request for approval of substitute material or equipment, sufficient data to show conclusively that it is equivalent to that specified in the following respects:
   1. Performance:
      a. Capacity at conditions and operating speeds scheduled shall be equal to or greater than that of the specified equipment.
      b. Energy consumption at the point of rating shall not exceed that of the specified equipment.
      c. Vibration and noise production at the point of rating shall not exceed that of the specified equipment.
   2. Materials of construction.

3. Gauges, weights and sizes of all portions and component parts.
4. Design arrangements and workmanship.
5. Coatings, finishes and durability of wearing parts.
6. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
7. Availability of prompt, reliable and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.

B. Requests for substitution shall include CONTRACTOR's reason for the request.

C. If ENGINEER does not consider the items equivalent to those specified, CONTRACTOR shall provide those specified.

D. See General Conditions for additional requirements.

PART 3–EXECUTION

3.01 CONTINUITY OF SERVICE

A. CONTRACTOR shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period.

B. No service shall be interrupted or changed without permission from OWNER. Written permission shall be obtained before any work is started.

C. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

3.02 CLEANING UP AND REMOVAL OF RUBBISH

A. All control panels, disconnect switch enclosures, junction boxes, and pullboxes shall be cleaned of debris and wires neatly arranged with surplus length cut off prior to installation of covers.

B. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

3.03 CONCRETE WORK

A. All cast-in-place concrete for new electrical equipment bases shown on the drawings shall be provided by CONTRACTOR except where specifically noted to be provided by others. All new equipment shall be set on 3 1/2-inch, minimum, above finished grade, leveling slabs or as shown on the drawings, including control panels. Pads shall be 3 inches larger than equipment being supported.

B. Concrete shall be minimum 6-bag, 4,000 psi, air-entrained, cast-in-place concrete. Reinforcing shall be grade 60.

C. Provide all anchor bolts, metal shapes, and templates to be cast in concrete or used to form concrete for support of electrical equipment.

3.04 PAINTING

A. All painting of electrical equipment shall be done by CONTRACTOR unless equipment is specified to be furnished with factory-applied finish coats.

B. All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified.

C. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment or during construction, the equipment shall be refinished by CONTRACTOR to the satisfaction of ENGINEER.

D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

3.05 CAULKING

A. Caulk with a caulking sealant where indicated on the electrical drawings or hereinafter specified.

B. Caulking sealant shall be silicone construction sealant as manufactured by General Electric or two-part polysulfide conforming to the requirements of, and bearing the seal of, the Thiokol Chemical Corporation.

C. Caulking sealant shall contain no acid or ingredients which will stain stone, corrode metal, or have injurious effect on painting. It shall be colored to match adjacent surroundings.

D. Caulking shall be performed by craftsman skilled at such work.

3.06 COORDINATION

A. Provide wiring for all motors and all electrically-powered or electrically-controlled equipment.

B. All starters, disconnects, relays, wire, conduit, push-buttons, pilot lights, and other devices for the power and control of motors or electrical equipment shall be provided by CONTRACTOR, except as specifically noted elsewhere in these specifications or on the drawings.

C. Where other devices are provided by others, they shall be connected and wired by CONTRACTOR.

D. CONTRACTOR's drawings and specifications shall show number and horsepower rating of all motors furnished together with their actuating devices. Should any change in size, horsepower rating, or means of control be made to any motor or other electrical equipment after the contracts are awarded, any additional costs because of these changes shall be the responsibility of CONTRACTOR.

E. All motors shall be provided for starting in accordance with local utility requirements and shall be compatible with starters as specified herein or under the various trades' sections of these specifications.

F. CONTRACTOR shall provide all power and control wiring and connect all equipment complete and ready to operate.

G. CONTRACTOR shall connect and wire all apparatus according to approved wiring diagrams furnished by the various trades.

3.07 EXCAVATION AND BACKFILL

A. Backfill of exterior trenches shall be compacted granular fill.

B. Lines passing under foundation walls shall have a minimum of 1 1/2-inch clearance.

C. Care shall be taken to insure no disturbance of bearing soil under foundations.

D. CONTRACTOR shall follow underground pipe runs where possible to avoid additional rock excavation.

3.08 EQUIPMENT ACCESS

A. CONTRACTOR shall coordinate work of this division with that of other divisions so that all systems, equipment, and other components will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment, not just that installed under this division.

B. Any components for the electrical systems which are installed without regard to the above shall be removed and relocated as required to provide adequate access at CONTRACTOR's expense.

C. All equipment, junction and pull boxes, and accessories shall be installed to permit access to equipment for maintenance. Any relocation of conduits, equipment, or accessories to provide maintenance access shall be accomplished by CONTRACTOR at no additional cost.

D. Electrical equipment, devices, instruments, hardware, etc. shall be installed with ample space allowed for removal, repair, calibration, or changes to the equipment. Ready accessibility to equipment and wiring shall be provided without moving other equipment which is to be installed or which is already in place.

3.09 WORKMANSHIP

A. Install work using procedures defined in NECA Standard of Installation.

B. Location of process equipment as shown on the drawings is approximate.

C. Utilization equipment and control devices required under these specifications shall be mounted in a code-approved manner.

D. Locations of utilization equipment and control devices as shown on drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance will be performed at no additional cost to OWNER.

E. Unless otherwise noted, equipment shall be fastened to foundation, structure, or equipment framework and not placed on grade.

F. Where materials, equipment apparatus, or other products are specified by manufacturer brand name and type of catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the bid.

G. Materials and equipment of the types for which there are National Board of fire Underwriters' Laboratories (UL) listing and label service shall be so labeled and shall be used by CONTRACTOR.

3.10 AREA CLASSIFICATION

A. As noted on the drawings.

3.11 MODIFICATIONS TO EXISTING CONSTRUCTION

A. Alterations:
   1. Alter, extend, and reconnect conduits as necessary.
   2. Reconnect existing conduits which were reused, cut, or exposed because of construction as quickly as possible.
   3. All new conduits, wiring, and electrical items shall be connected to the existing systems so as to function as a complete unit.
   4. Where existing electrical equipment, devices, electrically operated items, etc., interfere with any rehabilitation work, they shall be removed and reinstalled in another location to avoid such interferences. All existing and relocated equipment shall be left in good operating condition.

B. CONTRACTOR shall remove all conduit and wiring associated with items specified herein and/or shown on the drawings to be removed.

C. Include in Bid removal of existing electrical material and equipment as specified hereinafter, as noted on the drawings, or as needed by field conditions.

END OF SECTION 16-010

SECTION 16-110

CONDUIT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Rigid aluminum conduit.
   2. PVC internally and externally coated galvanized rigid metal conduit.
   3. Polyvinyl chloride conduit and fittings.
   4. Liquid-tight flexible metal conduit and fittings.
   5. Conduit seals and special fittings.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ANSI/NEMA FB 1–Fittings and Supports for Conduit and Cable assemblies.

B. NEMA RN 1–PVC Externally and Internally-Coated Galvanized Rigid Steel Conduit.

C. ANSI C80.5–Electrical Rigid Aluminum Conduit (ERAC).

1.03 QUALITY ASSURANCE

A. Manufacturers of Raceways: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical cable, raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. Prior to shipment to the site, all conduit shall be new, unused material and may not have been stored outdoors or exposed to weather.

F. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit.

B. Handle conduit carefully to prevent end-damage and to avoid scoring the finish.

C. Store conduit inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable waterproof wrapping.

PART 2–PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS

A. Rigid Aluminum Conduit: ANSI C80.5. Heavy wall.

B. Conduit bodies for rigid aluminum conduit shall be as manufactured by Appleton, Form 85, or equal, and be constructed of pressure-cast, copper-free aluminum for sizes 2 inches and under, and sand-cast, copper-free aluminum for sizes over 2 inches. Conduit bodies shall have built-in pulling rollers, domed gasketed covers, and stainless steel screws. CONTRACTOR shall select body style and size per application.

C. PVC-coated conduit and fittings shall be internally and externally hot-dipped galvanized rigid metal conduit with hot galvanized threads and PVC coating. PVC coating shall be UL listed with rigid metal conduit as the primary means of corrosion protection for the conduit and PVC coating. Acceptable manufacturers shall be Plasti-bond RedH$_2$OT by Robroy Industries, Permacote Industries Supreme Conduit System, or equal. PVC-coated conduit and fittings shall meet the following listings and manufacturing standards and shall bear the ETL Verified PVC-001 label to signify conformance to the adhesion performance standard.
1. Federal Specification WW-C-581 E.
2. ANSI C80.1
3. Electrical Rigid Metal Conduit–Steel UL 6 and UL 514B (Conduit, Tubing, and Cable Fittings).
4. ETL verified to Intertek ETL SEMKO high temperature water PVC coating adhesion test procedure.

D. Conduit bodies for PVC coated rigid conduit shall be as manufactured by Plasti-bond RedH$_2$OT by Robroy Industries, Perma-Cote Industries Supreme Conduit System, or equal, and have a 40 mil PVC exterior coating and 2 mil red urethane interior coating. Conduit bodies shall be Form 7 style or pulling elbow and include domed, gasketed covers and stainless steel screws. CONTRACTOR shall select body style and size per application.

2.02 POLYVINYL CHLORIDE CONDUIT (PVC) AND FITTINGS

A. Conduit: Heavy wall rigid, Schedule 40, UL listed for underground, encased, and aboveground applications. PVC conduit installed in exterior locations shall be UV-resistant.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.03 LIQUIDTIGHT FLEXIBLE METAL CONDUIT AND FITTINGS

A. Conduit: Electrogalvanized single-strip steel with PVC coating and integral grounding conductor. Liquidtight conduit installed in exterior locations shall be sunlight resistant. Conduit shall be UL listed.

B. Fittings: ANSI/NEMA FB 1.

2.04 CONDUIT SUPPORTS AND SPECIAL FITTINGS

A. Conduit shall be sealed with duct sealing compound, OZ Gedney Type DUX, or equal.

B. Expansion Fittings: Crouse Hinds or Robroy, type XJG, or equal, for rigid, IMC, or PVC-coated rigid conduit. Crouse-Hinds, type XD, or equal for PVC conduit.

C. Expansion-Deflection Fittings: OZ type "DX", Crouse-Hinds, type XD, or Appleton.

D. Mechanical Seals: 316 stainless steel, Link Seal, or equal. Link Seals shall be provided with 316 stainless steel bots, nuts, and fasteners.

E. Conduit Clamps, Straps, and Supports: Fiberglass, PVC or 316 stainless steel with no crevices.

F. Watertight Hubs: Die-cast, insulated, and gasketed, rated for wet or dry locations, indoors or outdoors. Watertight hubs shall be Appleton HUB, Crouse Hinds Meyers Hubs, or equal.

PART 3–EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Size conduits for branch circuit conductors, control wires, and instrumentation cables so as to have not less than 25% spare capacity after installation; 3/4-inch minimum size. Minimum size for liquid-tight flexible metal conduit is 1/2-inch.

B. Maintain at least 1-inch separation between conduit sizes to 1 1/2 inches; 2 inches between conduits 1 1/2 inches or larger. Maintain 1-foot separation between signal conduits (below 100 volts) and power conduits (100 volts and above).

3.02 CONDUIT INSTALLATION

A. Provide for the proper application, installation, and location of inserts and supports and anchor bolts for a satisfactory raceway system. Where any component of the raceway system is damaged, replace or provide new raceway system.

B. Run conduits concealed to avoid adverse conditions such as heat and moisture, to permit drainage, and to avoid all materials and equipment of other trades.

C. Ream conduit smooth at ends, cap upon installation, rigidly attach to structural parts of the building, and securely fasten to all outlet boxes, panel cabinets, junction boxes, pull boxes, splicing chambers, safety switches, and all other components of the raceway system.

D. Independently support or attach the raceway system to structural parts of construction in accordance with good industry practice.

E. Conduits passing through masonry, concrete, or similar construction shall be cast-in-place using PVC-coated rigid conduit extending completely through the construction.

F. Where wall penetrations through existing walls are below grade, cored openings shall be sealed with waterproof mechanical seals. Cores shall be pitched slightly so that conduit slopes away from building or structure. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer.

G. Conduit shall not be run in slabs-on-grade or structural topping slabs.

H. Conduits installed for future equipment or electrical work shall be cut off and capped flush with finished grade or slab. Conduit ends shall have threaded fittings to accommodate future conduit installation.

I. Provide all empty raceways 2 1/2 inches and over with No. 10 galvanized fishwire, and nylon cord for conduits smaller than 2 1/2 inches. Empty raceways and fishwire/nylon cord shall be identified with permanent label, and label shall include conduit termination point. All empty conduits shall be threaded, capped, and flush with finished grade or slab. Exposed conduits shall be threaded and capped.

J. Provided conduit raceway for exposed cables that are not sunlight resistant. This shall include, but not be limited to, instrument wiring, etc.

K. Provide conduit expansion fittings as specified herein, in all conduit runs that cross a structural expansion joint, and for conduits protruding from earth where the conduit is terminated within 5 feet of finished grade.

L. Provide conduit expansion/deflection fittings as specified herein in all conduit runs where movement perpendicular to axis of conduit may be encountered.

M. All conduits that protrude from poured concrete shall be PVC-coated rigid conduit. Conduit shall extend a minimum of 4 feet beyond the poured concrete (both sides).

N. Conduit seals shall be provided when conduits pass from an interior to exterior location.

O. Liquid-tight flexible conduit shall be installed in such a manner that liquids tend to run off the surfaces and not drain towards the fittings.

P. All runs of flexible conduit to equipment and devices shall be as short as practicable, of the same size as the conduit is extends, and with enough slack to reduce the effects of vibration to a minimum. A minimum of 18 inches of flexible conduit shall be installed for each motor.

Q. Where fittings are brought into an enclosure with a knock-out, a gasket assembly consisting of an O-ring and retainer shall be installed on the outside. Fittings shall be insulated throat type.

R. PVC conduit shall be securely fastened to a structure at intervals not exceeding 3 feet, or closer.

S. All conduit installed below grade shall be buried a minimum of 2 feet 0 inches.

T. PVC conduit installed in earth shall be bedded in compacted sand with a minimum of 6-inch cover on all sides.

U. Conduit bends for PVC conduit shall be made using a hot box, heat blanket, or glycol bender. Open flame or point heat sources of any type are not allowed.

V. The PVC-coated rigid conduit manufacturer's touch-up compound shall be used on all conduit interior and exterior bare steel exposed because of nicks, cuts, abrasions, thread cutting and reaming; minimum six coats.

3.03 CONDUIT INSTALLATION SCHEDULE

A. The following schedule lists specific conduit types allowed in designated areas. Those areas not listed under a specific conduit type shall not have that type of conduit installed.
   1. Rigid aluminum: All locations where attached to aluminum railings of aluminum structure members (i.e., elevated tank ladders).
   2. PVC Coated Rigid Steel:
      a. Conduits protruding from concrete.
      b. Interior and exterior locations requiring mechanical protection.
      c. Earth.
      d. Exterior locations and locations exposed to weather.
      e. Within 6 feet of a structure footing or wall.
   3. PVC:
      a. Earth, except within 6 feet of a structure footing or wall.
      b. Service entrance ground conductors.
   4. Liquid-tight Flexible Metal Conduit not over 3 feet in length for connections to:
      a. Equipment with sliding basis or flexible positioning.
      b. Equipment with vibration isolation mounting.
      c. Equipment housing ferromagnetic cores or with integral moving components capable of generating noise or vibrations, including motors.

END OF SECTION 16-110

SECTION 16-120

WIRE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wire.
   2. Terminal blocks and accessories.
   3. Wiring connections and terminations.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Manufacturers of Wire: Firms regularly engaged in the manufacture of electrical wire products of the types and ratings needed whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.03 SUBMITTALS

A. Submit shop drawings and product data under the provisions of Section 01300–Submittals.

B. Submit shop drawings for wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

C. Submit manufacturer's instructions.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Provide factory-wrapped, waterproof, flexible barrier material for covering wire on wood reels, where applicable; and weather-resistant fiberboard containers for factory-packaging of wire, connectors, outlets, boxes, lamps, fuses, etc., to protect against physical damage in transit. Do not install damaged wire or other material; remove from project site.

B. Store wire and other material in factory-installed coverings in a clean, dry, indoor space which provides protection against the weather.

PART 2–PRODUCTS

2.01 WIRE

A. All wire for permanent installation shall be new stranded copper, delivered to project in unopened cartons or reels, except where specifically noted and be UL listed for the use intended. No wire smaller than 12 AWG shall be used unless specifically noted. The use of multi-conductor cable is NOT ALLOWED.

B. Motor circuit branch wiring and associated control wiring:
   1. Insulation type shall be XHHW-2.
   2. Minimum size for motor control wiring shall be 14 AWG.
   3. Control wiring for supervisory equipment shall be shielded, sized per equipment manufacturer's recommendations, or as shown on drawings.

C. All wiring within control panels and supervisory control centers shall be insulation type MTW, minimum size 16 AWG.

D. Wiring shall be XHHW-2.

E. All available colors shall be used; however, green shall be used only for equipment grounds. Where color-coded wire in larger sizes is not available, one wrap of 1-inch-wide, colored, self-adhesive tape at each terminal end shall be used for identification. Initial phase color shall be used throughout the run, even for switch legs. Colors must meet code requirements for each class voltage. Do not duplicate colors, including neutral, on different voltages.

F. Color Coding:

	120/240V
A Phase	Black
B Phase	Red
C Phase	Blue
Neutral	White
Travelers	Yellow
Equipment Ground	Green

G. Circuits 150 feet or over shall be sized for a maximum 2% voltage drop.

2.02 WIRING CONNECTIONS AND TERMINATIONS

A. Stranded conductors may only be terminated with UL or ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device.

B. Provide insulated, **silicone-filled** spring wire connectors with plastic caps for 8 AWG conductors and smaller. Connectors shall be King Silicone-Filled Safety Connectors, or equal. Spring wire connectors shall only be allowed in junction, outlet, or switch boxes.

C. No splices will be allowed unless acceptable to ENGINEER. Where allowed, provide in-line splices for all conductor connections, 6 AWG and larger. Splice crimp component shall be Burndy copper compression splice long barrel, beveled entry, type YS, or equal. Splice shall be made with crimp tool by manufacturer that allows expanded conductor ranges. Splice insulation component shall be Raychem heavy-wall, low voltage tubing, type WCSM, or equal.

2.03 TERMINAL BLOCKS AND ACCESSORIES

A. Terminal Blocks: ANSI/NEMA ICS 4: UL listed.

B. Power Terminals: Unit construction-type, closed-back-type, with tubular pressure screw connectors, rated 600 volts.

C. Signal and Control Terminals: Modular construction-type, channel mounted; tubular pressure screw connectors, rated 300 volts.

D. Manufacturer and Model Number: Phoenix Contact UK 5 N, or equal.

PART 3–EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the work is to be installed and notify CONTRACTOR of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 GENERAL WIRING METHODS

A. Install electrical wire and connectors in accordance with the manufacturer's written instructions; applicable requirements of the NEC, the National Electrical Contractors Association's "Standard of Installation"; and in accordance with recognized industry practices to ensure that products serve the intended functions.

B. Place an equal number of conductors for each phase of a circuit in same raceway.

C. Splice only in junction or outlet boxes. Splicing is not allowed in disconnects, control panels, etc. Avoid splices between terminals of interconnecting power and control wiring.

D. Spring wire connectors shall only be used in junction, outlet, or switch boxes. Equipment wireways (e.g. disconnects, etc.) and control panels shall not have any spring wire connectors installed; all terminations shall be on terminal strips.

E. Neatly train, lace, and tie wrap all wiring inside boxes, equipment, control panels, and enclosures.

F. Make conductor lengths for parallel circuits equal.

G. The same color shall be used for each numbered wire throughout its entire length.

H. Terminate all wiring on terminal blocks in control panels and similar equipment. This shall include all spare or unused wires.

I. Provide preprinted adhesive or heat shrink-type wire numbering labels at all terminations and splices. Wire numbering preprinted on the conductor, flag-type labels, and individual wraparound numbers (e.g. Brady labels) are not acceptable.

J. Use appropriate wiring methods and materials for the equipment or environment.

K. Do not use a pulling means which can damage the raceway.

L. Conductors #6 AWG and larger shall be pulled in to conduits utilizing a tugger with built-in tension meter. CONTRACTOR shall provide a report to ENGINEER for each pull indicating maximum

tension reached during the pull along with manufacturer's maximum pulling tension. Motorized machines of any type are NOT ALLOWED for any wire pulling.

M. Signal wiring (below 100 volts) wiring must be in a conduit separate from power and/or control wiring (over 100 volts). Signal wire shall include, but not be limited to, loop powered devices, and communication wiring (i.e. RS-232, etc.).

N. Provide junction or pull boxes to facilitate the "pulling in" of wires or to make necessary connections. All raceways and apparatus shall be thoroughly blown out and cleaned of foreign matter prior to pulling in wires.

O. Thoroughly clean wires before installing lugs and connectors.

P. Make splices, taps, and terminations to carry full capacity of conductors without perceptible temperature rise.

Q. Terminate spare conductors within equipment, control panels, etc. on terminal strips and label as "SPARE." Spare wiring in pull or junction boxes may be terminated with electrical tape and labeled as "SPARE." All spare conductor labels shall indicate where the conductors terminate. Refer to Section 16195–Electrical Identification, for additional requirements.

3.03 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 4 AWG and larger wires. Yellow 77 pulling lubricant is not allowed.

B. Install wire in raceway after all mechanical work likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system before installing conductors.

D. Conductors shall be installed in conduit system in such a manner that insulation is not damaged, conductors are not overstressed in pulling, and walls are not damaged. No splices are permitted except in junction boxes or outlet boxes.

E. CONTRACTOR shall observe code limitation on the number and size of wires in an outlet box. CONTRACTOR shall either lay out work so that the wires do not exceed the particular box limitation, or provide larger boxes approved for additional capacity.

F. Individual phases for all power wiring shall be identified with colored tape at all lugs/terminations. The same phase relation shall be maintained throughout.

G. Circuiting is indicated diagrammatically on the drawings.

3.04 FIELD QUALITY CONTROL

A. Inspect wire for physical damage and proper connection.

B. Torque test conductor connections and terminations to manufacturer's recommended values.

C. Prior to energizing, check conduit, raceways, outlet boxes, and wire for continuity of circuitry and for short circuits. Correct malfunction when detected.

D. Subsequent to wire hook-ups, energize circuitry and demonstrate functioning in accordance with these specifications.

E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

F. Perform field inspection and testing according to provisions of this section.

3.05 ACCEPTANCE TESTS

A. CONTRACTOR shall furnish all materials, labor, and equipment necessary for the acceptance tests specified herein. Acceptance tests shall be performed in the presence of OWNER or OWNER's representative and must be passed before final acceptance of the work.

B. CONTRACTOR shall be responsible for powered tests of each field installed device unless specifically noted otherwise. CONTRACTOR shall be responsible for device operation as powered from its power source.

C. Operation Test–By operational testing, OWNER will give final acceptance of the wiring system when all of the wiring is considered a complete system. All equipment shall function and operate in the proper manner as indicated in the details of the specifications and on the drawings. All motors shall be properly connected to protective devices, and motor rotation shall be in the correct direction.

D. At the request of OWNER's representative, demonstrate by test the compliance of the installation with these specifications and drawings, the National Electrical Code, and the accepted standards of good workmanship. These tests shall include operation of equipment, continuity of the conduit system, grounding resistance and insulation resistance.

E. A written record of performance tests on electrical and control and instrumentation systems and equipment shall be supplied to OWNER. Such tests shall show compliance with governing codes.

3.06 WIRE INSTALLATION SCHEDULE

A. Install all wiring in raceways except as otherwise noted. This includes all low voltage wiring such as control, instrumentation, etc.

END OF SECTION 16-120

SECTION 16-130

BOXES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wall and ceiling outlet boxes.
   2. Pull and junction boxes.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ANSI/NEMA OS 1–Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

B. ANSI/NEMA OS 2–Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. NEMA 250–Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

A. Manufacturers of switches, outlets, boxes, lamps, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical cable, boxes, raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01300–Submittals.

PART 2–PRODUCTS

2.01 SWITCH, OUTLET, AND SMALL JUNCTION BOXES

A. Cast Boxes: Aluminum or cast feraloy, deep-type, gasketed cover, threaded hubs, Crouse-Hinds FD Series, or equal.

B. PVC-Coated Cast Boxes: Provide PVC-coated cast boxes in areas where PVC-coated conduit is used. Boxes shall be by the same manufacturer as the conduit.

C. NEMA 4X Boxes: PVC or FRP, Carlon HS Series, or equal, with proper cover and gasket.

2.02 PULL AND JUNCTION BOXES

A. Cast Boxes: NEMA 250; Type 4, flat-flanged, surface-mounted junction box, UL-listed as watertight. Cast aluminum or feraloy box and cover with ground flange, neoprene gasket, and stainless steel cover screws, Crouse-Hinds WCB Series, or equal.

B. PVC-Coated Cast Boxes: Provide PVC-coated cast boxes in areas where PVC-coated conduit is used. Boxes shall be by the same manufacturer as the conduit.

C. NEMA 4X Boxes: PVC or FRP, Carlon FS Series, or equal with proper cover and gasket.

D. Boxes Larger Than 12 inches in Any Dimension: Hinged enclosure in accordance with Section 16160–Cabinets and Enclosures.

E. Boxes specified in this section are not allowed to have knockouts and are not allowed to be used as enclosures for control panels.

PART 3–EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as necessary for splices, taps, wire pulling, cable bending radii, equipment connections, and code compliance.

B. Where dedicated raceways are provided for different voltage systems or wiring, separate boxes shall also be provided unless approved by ENGINEER. Where approved by ENGINEER, combined boxes shall be physically divided to separate the wiring.

C. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of access doors.

D. Locate and install to maintain headroom and to present a neat appearance.

E. All boxes attached to building surfaces which may be damp shall be spaced out to avoid rust and/or corrosion. All boxes in damp locations shall be on 1-inch standoffs. Damp locations shall include, but not be limited to, exterior locations, and all areas belowgrade.

3.02 SWITCH AND OUTLET BOX INSTALLATION

A. Provide knockout closures for unused openings.

B. Support boxes independently of conduit.

C. Use multiple gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

D. Switch and outlet boxes provided for branch circuits and feeders shall not contain control wiring. Control wiring shall have dedicated pull and junction boxes provided. Wiring for different voltage systems (e.g., 24 V, 120 V, 480 V) shall have dedicated pull and junction boxes for each voltage.

E. For weatherproof switches, devices, and exterior fixtures, use cast boxes with proper cover and gasket.

F. All exterior outlet boxes shall be NEMA 4X.

G. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

H. Boxes shall be of a depth to accommodate wires and splices. Conduit will not be considered as adequate supports.

I. Cast boxes with 3/4-inch hubs and aluminum fittings and enclosures may be used with all conduit types.

3.03 PULL AND JUNCTION BOX INSTALLATION

A. Support pull and junction boxes independent of conduit.

B. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

C. All junction boxes shall be labeled with permanent labels (not adhesive type). Permanent labels shall include painted stencil-type labels or engraved laminated nameplates. Labels shall indicate circuit or load served, as well as power source.

D. All exterior junction and pull boxes shall be NEMA 4X. Boxes in areas subject to damage shall be stainless steel.

END OF SECTION 16-130

SECTION 16-160

CABINETS AND ENCLOSURES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Hinged cover enclosures.
   2. Cabinets.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. NEMA 250–Enclosures for Electrical Equipment (1000 Volts Maximum).

B. ANSI/NEMA ICS 1–Industrial Control and Systems.

C. ANSI/NEMA ICS 6–Enclosures for Industrial Control Equipment and Systems.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

B. Show Drawings for Equipment Panels: Include wiring schematic diagram, connection diagram, outline drawing, and construction diagram as described in ANSI/NEMA ICS 1.

PART 2–PRODUCTS

2.01 HINGED COVER ENCLOSURES

A. Construction: NEMA 250, larger than 12 inches in any dimension. Acceptable manufacturers: Hoffman, B-Line, or equal.

B. Covers: Continuous hinge, applicable NEMA rating with hasp and staple for padlock.

C. Back Panel for Mounting Terminal Blocks or Electrical Components: 14 gauge steel, white enamel finish.

D. All cabinets with double doors or that are free-standing shall have 3-point latch.

2.02 CABINETS

A. Construction: NEMA 250. Acceptable manufacturers: Hoffman, Saginaw, Lehman, or equal.

B. Cabinet Fronts: Steel, surface-type with screw cover front, concealed hinge and flush lock. Finish in white baked-enamel.

2.03 FABRICATION

A. Shop-assembled enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.

B. Provide conduit hubs on all enclosures.

C. Provide protective pockets inside front cover with schematic diagram, connection diagram, and layout drawing of control wiring and components within enclosure.

D. Provide gasketed surfaces for all enclosure and cabinet doors and covers.

2.04 ENCLOSURE RATING

A. Cabinets and enclosures shall be rated as outdoor or wet location: NEMA 4X, stainless steel, unless noted otherwise on the drawings.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install cabinets and enclosures plumb. Anchor securely to wall and structural supports at each corner minimum.

B. All cabinets and enclosures shall be labeled with permanent labels (not adhesive-type). Permanent labels shall include painted, stencil-type labels or engraved laminated nameplates (4 inches by 4 inches minimum size).

C. Provide accessory feet for free-standing equipment enclosures.

D. All cabinets and enclosures attached to building surfaces which may be damp shall be spaced out to avoid rust and/or corrosion. All boxes in damp locations shall be on 1-inch standoffs. Damp locations shall include, but not be limited to, exterior locations and all areas below grade.

END OF SECTION 16-160

SECTION 16-190

SUPPORTING DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Conduit and equipment support members.
   2. Fastening hardware.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

PART 2–PRODUCTS

2.01 MATERIAL

A. Support Members: 316 stainless steel, fiberglass, or PVC in exterior locations and damp locations. PVC-coated steel where used with PVC-coated conduit.

B. Hardware: Stainless steel in exterior locations and damp locations.

C. Manufacturers: Unistrut P-1000, B-line, Superstrut, or equal.

2.02 ANTENNA COAX CABLE SUPPORTS

A. Support Members: UV resistant fiberglass material with gripping ribs.

B. Hardware: Stainless steel round member adapter.

C. Manufacturer: Andrew Corporation click-on single hanger kit with 34670-4 round member adapter, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or support members. Do not use spring steel clips and clamps. Provide standoffs as specified in other technical sections.

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, expansion anchors or preset inserts in solid masonry walls; and self-drilling anchors or expansion anchors on concrete surfaces.

C. Where support members are used for conduit, cutoff ends shall be ground smooth. Cutoff PVC-coated support members shall be ground smooth and touched-up with PVC coating material from the manufacturer.

D. Do not fasten supports to piping or conduit.

E. Do not use powder-actuated anchors.

F. Do not drill structural steel members.

G. Fabricate supports with welded end caps and all welds and surfaces ground smooth for neat appearance. Use hexagon head bolts with steel spring-lock washers under all nuts.

H. In wet locations anchor all equipment to walls with standoffs and caulk.

I. Install surface-mounted cabinets and panelboards with minimum of four anchors.

J. Do not use chain hangers.

K. All welds shall be continuous and ground smooth.

END OF SECTION 16-190

SECTION 16-195

ELECTRICAL IDENTIFICATION

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Nameplates.
   2. Labeling tags.
   3. Wire markers.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01300–Submittals.

B. Provide schedule for nameplates and labeling tags for shop drawings. Reference drawings for type used.

PART 2–PRODUCTS

2.01 NAMEPLATES

A. Type "A":
   1. Use:
      a. Each separately mounted disconnect switch.
      b. Cabinets, enclosures, pull, and junction boxes.
      c. Field devices (flowmeter transmitters, etc.).
   2. Size: 2-inch by 3-inch.
   3. Material: 3-layer laminated Micarta.
   4. Background Color: Black.
   5. Character Color: White.
   6. Character Size: 1/4-inch.
   7. Engraving: See drawings for labels or as requested by ENGINEER. Label shall include equipment number and description.
   8. Mounting Location: Front exterior.

B. Type "B":
   1. Use: Supervisory Control Panels.
   1. Size: 4-inch by 4-inch.
   2. Material: 3-layer laminated Micarta.
   3. Background Color: Black.
   4. Character Color: White.
   5. Character Size: 2 1/4-inch.
   6. Engraving: Equipment label shall include equipment number and description (i.e. SCC-A, KY 277/Reservoir Avenue Tank).
   7. Mounting Location: Equipment: Top wireway.

2.02 LABELING TAGS

A. Use: Filed-mounted devices (limit switches, etc.).
   1. Size: 1-inch by 3-inch.
   2. Material: 1/32-inch-thick stainless steel.
   3. Character Size: 1/4-inch.
   4. Engraving: As requested by ENGINEER.

2.03 WIRE MARKERS

A. Wire markers shall be permanently attached sleeve or heat shrink-type labels. Wire numbering preprinted on the conductor, flag-type labels, and individual wrap around numbers (such as Brady preprinted markers) are not acceptable. All wire markers shall be the same throughout the project.

B. Wire markers shall be specifically printed for this project using permanently attached computerized adhesive tags, such as Brady IDXPERT labeling printer with self laminating vinyl, permasleeve heat-shrink polyolefin, or equal. Hand-written markers are not acceptable.

PART 3–EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Affix nameplates with stainless steel screws in outdoor locations and stickyback adhesive in indoor locations.

D. Affix labeling tags with permanent bonding cement or locking wire ties. Provide 3/8-inch hole to accommodate wire tie.

E. Prepare and install neatly typed directions in all panels including existing panels where work is done under this Contract.

3.02 WIRE IDENTIFICATION

A. Provide wire markers on each conductor, including neutral and spare conductors, in gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Spare conductors shall have control wire number of shall indicate termination point of wire.

B. Conductors in pull boxes, supervisory control panels, cabinets, and enclosures shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system.

END OF SECTION 16-195

SECTION 16-420

ELECTRICAL SERVICE SYSTEM

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Utility company.
   2. Secondary service characteristics.
   3. Definitions.
   4. Sequencing, scheduling.
   5. Underground electrical service.

B. Allowances: CONTRACTOR shall INCLUDE in the Bid the cost of providing Underground Electrical Service at:

   'Bucksville I' Master Meter (Site #4)
   'Dennis/Corinth and Denis' Master Meters (Site #8)

C. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 UTILITY COMPANY

A. The Utility Company at Project Site #4 and #8 is Warren Rural Electric (WRECC).

1.03 SECONDARY SERVICE CHARACTERISTICS

A. The secondary service will be 240/120-volt, 3-wire, single-phase.

1.04 DEFINITIONS

A. Service–As defined in the NEC, Article 100.

B. Secondary Voltage–600 volts and below.

1.05 SEQUENCING, SCHEDULING

A. Provide electrical service system, except the Utility Company will provide:
   1. Terminal pole and pole-mounted transformer.
   2. Cable from transformer to meter.
   3. Metering.

1.06 UNDERGROUND ELECTRICAL SERVICE

A. Provide complete underground electrical service except for items furnished and installed by the Utility Company.

B. Coordinate the electrical service with the Utility, and all Utility coordination costs shall be included in the Lump Sum Bid. All costs associated with temporary service of any type shall be included in CONTRACTOR's bid. Costs for materials and work provided by the Utility shall be paid for by OWNER.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 INSTALLATION

A. Trench and backfill for duct lines in accordance with Division 2.

B. Install top of duct lines a minimum of 2 feet below finish grade and pitch for drainage.

END OF SECTION 16-420

SECTION 16-450

SECONDARY GROUNDING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Power system grounding.
   2. Electrical equipment and raceway grounding and bonding.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 SUBMITTALS

A. Indicate location of system grounding electrode connections and routing of grounding electrode conductor.

B. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

PART 2–PRODUCTS

2.01 MATERIALS

A. Ground Rods: Copper bonded, 5/8-inch diameter, minimum length 10 feet.

B. Ground Connections Below Grade: Exothermic type, Cadweld, or equal.

C. Ground Fittings: O-Z/Gedney, Type ABG, CG, TG, KG, GBL, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. Provide a separate insulated equipment grounding conductor and neutral conductor (where applicable), for each feeder and branch circuit. Terminate each end on a grounding lug, bus, or bushing.

B. Bond together system neutrals, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, and receptacle ground connectors.

C. Ground equipment as required by code and local ordinances.

D. All feeder neutrals shall be connected to neutral at only one point in the supervisory control panel.

E. All bare copper conductors installed outdoors shall be buried a minimum of 2 feet belowgrade.

F. Include ground for grounded receptacles and other equipment items shown on drawings.

G. Flexible connections do not qualify for ground. All flexible connections must have separate green ground wire from motor base or equipment frame to conduit system.

H. Provide a separate grounding conductor system for the grounding of all devices installed in the same conduit as the branch circuit conductors. Ground conductors shall be individually connected at each device.

I. All equipment that is fed from circuits in PVC conduit shall be provided with a separate green ground wire that is terminate at the metallic conduit system and the equipment.

J. Refer to Specification Section 16-930 "Instrument Wire and Cable" for additional grounding requirements.

K. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION 16-450

SECTION 16-930

INSTRUMENT AND COMMUNICATION WIRE AND CABLE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This specification contains the requirements for instrument wire and cable as opposed to electrical power wire and cable.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section as listed in Division 1.

B. Qualifications of Installers: Use skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work.

1.03 PRODUCT HANDLING

A. Instrument cable shall be furnished in lengths as necessary.

B. Reels, coils, or package rolls of instrument cable shall be identified with the project name and other tagging identification as called for.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

PART 2–PRODUCTS

2.01 GENERAL

A. All materials of construction for cable and wire shall be compatible and noncontaminating.

B. Unless otherwise noted in these specifications, the requirements herein listed shall be strictly adhered to.

2.02 SHIELDED PAIR CABLING FOR ELECTRONIC INSTRUMENTS

A. Shielded pair cabling shall have stranded, tinned-copper conductors, No. 16 AWG (>500 LF cable run) or No. 18 AWG (<500 LF cable run), twisted with 2-inch lay.

B. Insulation of conductors shall be 15 mil, 90°C minimum PVC, rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties.

C. Color coding shall be manufacturer's standard or as stated.

D. The outer jacket shall be flame-retardant and weather- and ultraviolet-resistant PVC, 35 mils thick, and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the requirements of UL 1277. Cable shall be UL labeled as power-limited circuit cable.

E. If the cabling is not installed in steel conduits, a 100% coverage shield shall be applied over the insulated conductors. The shield shall consist of a 0.85 mil minimum thickness aluminum mylar tape. A No. 18 AWG, seven-strand, tinned-copper drain wire shall be furnished in continuous electrical contact with the shield.

F. Single-pair shielded cables shall be Belden 9316, or equal.

2.03 COAX CABLE (if applicable)

A. Coaxial Cable (CATV) RG6: Cable shall be listed as being suitable for use in environment defined and shall meet a CMP CMR Nonplenum Rated rating (or better, as defined by the 2003 NEC). Basic construction shall be as follows:
1. Center conductor: 18 AWG Copper Covered Steel; 0.040-inch o.d. (nominal); foamed polyethylene dielectric.
2. Inner shield: Aluminum-polypropylene aluminum-laminated tape with overlap bonded to dielectric.
3. Second shield: 60% 34 AWG bare aluminum braid wire.
4. Third shield: Nonbonded aluminum foil tape.
5. Outer shield: 42% 34 AWG bare aluminum braid wire.
6. Outer Jacket: Flame-retardant PVC.
7. Impedance: 75 Ohms.
8. Capacitance: 16.0 pF/ft (nominal).
9. Velocity of propagation: 84.0%.
10. Contractor shall install the coaxial cables, including connectors and splitters, as required.

B. F-Connector (Coax):
1. Coax cable shall be terminated in a Male F-type connector. The Male F-connector shall be matched to the cable type proposed by CONTRACTOR, be a single-piece connector, incorporate a 1/2-inch crimp ring which uses hex or compression crimp.
2. When preparing the cable for termination, manufacturer installation procedures shall be adhered to. Special care shall be taken to ensure the proper center conductor length as specified by the manufacturer.
3. The Male F connectors shall be mated to Female/Female Feed-through Couplings at the equipment as shown on the drawings. These Couplings shall be matched to the Male F-Connector type. Couplings shall be of sufficient length as to allow for the Male F-Connector to fully seat (both sides).

2.04 MULTIMODE FIBER OPTIC CABLE AND CONNECTORS (If Applicable)

A. Fiber optic cable shall be Indoor/Outdoor listed type OFNR and shall be suitable for use inside building and outside plant applications, including duct and conduit installation in accordance with ICEA S-104-696. Installation in building risers shall be in accordance with NEC 770. Cable shall be DX-###-D-ALT-9-K-R as manufactured by Optical Cable Corporation, ###-T-8F-311-80-29 as manufactured by Corning, or equal. Fiber Optic Cable sizing (fiber count) shall be as shown on the drawings.

B. Individual fibers shall be multimode 50/125 microns meeting TIA/EIA 492AAAC and ISO/IEC 11801 type OM3 standards for laser-optimized fibers. Primary fiber coating diameter 250 um±15 and the secondary tight buffer-coating diameter shall be 900 microns (nominal). All coatings shall be mechanically strippable without damaging the optical fiber. Optical performance shall meet the following requirements:

Wavelength	850 nm	1300 nm
100 Mb Fast Ethernet	300 m	2000 m
Gigabit Ethernet Distance	1000 m	600 m
10-Gigbit Ethernet Distance	300 m	300 m
Maximum Attenuation	3.0 dB/km	1.0 dB/km
Minimum Laser Bandwidth EMB	2000 MHz-km	500 MHz-km
Minimum LED Bandwidth OFL	1500 MHz-km	500 MHz-km

PART 3–EXECUTION

3.01 INSTALLATION REQUIREMENTS AND SPECIAL CONSIDERATIONS

A. Shielded pair, coaxial cable, fiber optic, and Cat 6 cabling specified in this section shall be installed in conduit, and may not be run free-air or in nonmetallic tubing such as innerduct.

B. Although twisted conductors effectively reduce magnetic noise, where additional magnetic shield is necessary to minimize interference from stray magnetic fields, armored cable shall be provided.

C. Since magnetic interference is produced by currents flowing through conductors and electrical equipment, any instrument wire run near electric motors, generators, transformers, induction heaters, circuit breakers, motor starters, power lines, or AC power and control cables may need additional magnetic shielding.

D. Armor may be necessary on instrument cables installed in nonmagnetic electrical ducts:
   1. Single pair electronic instrument wiring: There shall be a steel wire armor of 24 gauge AISI 1006 soft annealed steel wire covering the inner jacket.
   2. The armor shall be covered by a flame-retardant and weather- and ultraviolet-resistant PVC, outer jacket 35 mil minimum thickness and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the physical characteristics of UL 1277. Cable shall be UL labeled as power limited cables.

3.02 GROUNDING

A. Shielded cabling shall be installed in accordance with manufacturer's instructions and to minimize electrical noise and interference to associated instruments. Refer to instrument manufacturer's instructions for additional requirements.

B. Ends of signal wires shall be sealed to prevent the migration of moisture into the cable and to prevent unintentional grounding of the shield at the open end. Seal signal wires using a minimum 1-inch piece of heat-shrink tubing installed over PVC jacket and individual wires, and heat-shrink to a watertight fit.

C. All shields must be grounded.

D. Shields shall be grounded at one point only. Shielded cabling shall be isolated and left open at the instrument.

E. Cable shield grounds shall be isolated from control system signal grounds, except at instrument system grounding electrodes.

F. The instrument ground shall be separate and isolated from the electrical power grounding system.

3.03 FIBER OPTIC CABLE INSTALLATION

A. Use Velcro bands to secure cable bundles within interior pull boxes and fiber patch panels.

B. Avoid excessive and sharp bends. Ensure manufacturer's recommended bend radius and pulling tensions are not exceeded.

C. Fittings or connections are allowed only at the input and output of devices. Splicing shall not be accepted in any cable run. The entire cable run shall be replaced in all such instances.

D. All cable shall be installed in conduit.

E. Conduit, raceways, and outlet boxes shall be provided as required.

F. All station cables installed through and within process areas shall be installed in conduit.

G. Cable slack shall be provided at end of the fiber optic cable. This slack is exclusive of the length of fiber that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a fashion as to protect it from damage and be secured in the termination enclosure or a separate enclosure designated for this purpose. Multiple cables may share a common enclosure. A minimum of 15 feet of slack cable shall be coiled and secured at each end of the fiber optic cable. Exact cable termination locations shall be field verified with OWNER and ENGINEER.

3.04 FIBER OPTIC TESTING

A. The fibers utilized in the installed cable shall be traceable to the manufacturer. Upon request by OWNER, CONTRACTOR shall provide cable manufacturer's test report for each reel of cable provided. These test reports shall include (1) manufacturers on reel attenuation test results at the specified wavelengths for each optical fiber of each reel prior to shipment from the manufacture and, (2) on-the-reel bandwidth performance as tested at the factory.

B. Prior to installation, CONTRACTOR shall perform tests deemed necessary by CONTRACTOR to ensure integrity of all optical fiber. Tests may range from a simple "flashlight test" to an OTDR of each optical fiber of each cable reel prior to installation.

C. Upon completion of cable installation and termination, the fiber optic cabling shall be tested to include:
   1. Optical Attenuation ("Insertion Loss" Method).
   2. Verification of Link Integrity (OTDR) if the cable has been spliced.

D. Optical Attenuation shall be measured on all terminated optical fibers in both directions of transmission using the "Insertion Loss" method. Measurement shall be inclusive of the optical connectors and couplings installed at the system endpoints. Access jumpers shall be used at both the transmit and receive ends to ensure that an accurate measurement of connector losses is made. Multimode fibers shall be tested in accordance with the IEC 61280-4-1, utilizing the appropriate cable reference 1, 2, or 3.

E. Attenuation of optical fibers shall not exceed the values calculated as follows: Attenuation (max.) = 2*C+L*F+S dB, where C is the maximum allowable connector loss (in dB), L is the length of the run (in kilometers), and F is the maximum allowable fiber loss (in dB/km). S is the total splice loss (number of splices* max. attenuation per splice).

F. Fiber runs that contain splices shall be tested for Verification of Link Integrity (OTDR). All fibers, even those that are left unterminated, shall be documented in one direction of transmission using an Optical Time Domain Reflectometer. Multimode fibers shall be tested at 850 nm (nominal). Single mode fibers (if applicable), shall be tested at 1300 (nominal). The OTDR(s) shall incorporate high-resolution optics optimized for viewing of short cable sections. Access jumpers of adequate length to allow viewing of the entire length of the cable, including the connectors at the launch and receive end, shall be used.

G. OTDR traces revealing a point discontinuity greater than 0.2 dB in a multimode fiber, or 0.1 dB in a single mode fiber (if applicable), at any of the tested wavelengths, or any discontinuity showing a reflection at that point shall be a valid basis for rejection of that fiber by OWNER. The installation of that cable shall be reviewed in an effort to remove any external stress that may be causing the fault. If such efforts do not remove the fault, that cable and the associated terminations shall be replaced at the expense of CONTRACTOR.

H. Upon completion of the installation, CONTRACTOR shall provide three complete test reports to ENGINEER for review. Documentation shall include the following items:
   1. Test results, submitted in hard copy or in electronic form (preferred). Where documentation provided in electronic form requires unique software for viewing test results, CONTRACTOR shall provide one licensed copy of the software along with the above documentation.

C. Cable shall be all dielectric, tight-buffered, dry water-blocking, gel-free, and shall meet UL 1666 and RoHS compliance. The PVC outer sheath shall be flame-retardant and marked with the manufacture's name, date of manufacture, fiber type, flame rating, and sequential length information. Outer jacket shall be aqua or black if exposed to sunlight.

D. Fiber shall be subjected to a minimum proof stress of 100 kpsi. The minimum bend radius rating for the cable during installation shall not be more than 20 times the outside diameter of the cable, and during operation no more than 15 times the outside diameter of the cable. Cable shall withstand a minimum installation tensile load of 2700 N (600 lbf) and a minimum continuous tensile load of 600 N (135 lbf) for a 12-strand cable. The cable shall comply with the optical and mechanical performance requirements as specified herein over the operating temperature range of -40°C to +70°C. The cable shall not be damaged in any way when exposed to the operating temperature range of -40°C to +70°C. The cable shall have an installation temperature range or -10°C to +60°C. Optical and mechanical performance shall not be degraded, and the cable shall not be damaged in any way by immersion in groundwater. The cable shall block water penetration without the use of gel-flooding compounds according to EIA-455-82B. The outer jacket material shall be suitable for long-term exposure to UV/sunlight and weather, with a life-expectancy in excess of 20 years.

E. Fibers shall be terminated with connectors recommended by the cable manufacturer. Connectors shall be provided on all fibers of each fiber optic cable. End connector styles (LC, Duplex SC or ST) shall be coordinated with the fiber termination panels and fiber transmitter/receiver devices. Connector and strain relief color shall be Aqua to identify the fiber as 50-micron laser optimized OM3. The connector ferrule shall be ceramic of glass-in-ceramic, metallic, or equivalent. The optical connector within the connector ferrule shall be secured with an adhesive or mechanical process to prevent pistoning and other movement of the fiber strand. Provide heat-shrink tubing section where cable is broken out to protect jacketing end and minimize overflexing of the subcables. End connectors shall have integral strain relief and shall be designed to minimize losses. Attenuation per mated pair shall not exceed 0.5 dB (individual); 0.3 dB (average). These values shall hold throughout the cabling system. Connectors shall sustain a minimum of 200 mating cycles per EIA/TIA-455-21 without violating these specifications.

F. Fiber optic patch cables shall be provided premanufactured in sufficient length to connect associated equipment to any port on the patch panel or switch.

G. All cables shall be installed in continuous lengths from endpoint to endpoint. Splices in fiber optic cables shall be allowed only where specifically identified on drawings or specified herein.

2.05 VOICE AND DATA CABLE (if applicable)

A. Provide 4-pair Unshielded twisted-pair cabling meeting EIA/TIA Category 6 requirements for HORIZONTAL VOICE AND DATA CABLING (STATION CABLING). Cable shall be rated for spaces as indicated on the drawings. Provide Systimax Solutions 1071E PVC, or equal.

B. Data and Voice Station Cables: Transmission characteristics of the Data Station Cables shall meet full Category 6 performance criteria as defined by the referenced TIA/EIA documents and this specification. Refer to the Execution Section which details the required performance criteria of the Permanent Link of which the Cable is a part. The jacket color for Data cables shall be BLUE. The jacket color for "Voice" cables shall be WHITE.

C. Faceplates: Systimax Solutions: "L" Type Flush-Mounted, Ivory, or equal.

D. Jacks: Systimax Solutions: MGS400-246 (Ivory) for voice, MGS400-112 (Orange) for data.

2. Insertion loss test data, including a record of test wavelengths, cable type, fiber and cable (or Outlet) I.D., measurement direction, test equipment type, model and serial number, date, reference setup, and crew member name(s).
3. OTDR traces (where applicable), including individual optical fiber "signatures" obtained as specified above. Trace files shall be so named as to identify each individual fiber by location in the cable system and fiber number or color. Where paper copy documentation of OTDR traces are provided, the vertical and horizontal scales shall be set so as to maximize the detail in each backscatter trace. The portion of the trace which depicts the fiber under test shall extend a minimum of 50% of the display area.

END OF SECTION 16-930

SECTION 16-940

CONTROLS AND INSTRUMENTATION

1.0 GENERAL

1.01 SYSTEM DESCRIPTION

A. The work includes furnishing, delivering, installing all items furnished, and placing in operation the Supervisory Control and Data Acquisition system (SCADA) for the new supervisory control panels at various master metering stations and storage tank stations in the East Logan Water District system; all in accordance with the Contract Specifications and Drawings.

B. System Supplier shall be defined as the fabricator, assembler, and supplier of all system components. This shall include, but not be limited to, all instrumentation as specified, all PLCs and required interface hardware and internal wiring, the SCADA system hardware, system drawings, system software, etc. See paragraph 1.08 for other System Supplier requirements.

C. CONTRACTOR shall inspect all work. The Bid shall include everything necessary to obtain a complete installation operating in accordance with these specifications and the Bidder's proposal, whether necessary items and equipment are contained in, or are remote from the enclosures furnished under this Contract. All responsibility for this system ultimately lies with CONTRACTOR.

D. CONTRACTOR shall be responsible for the placing of circuits and making of electrical and hydraulic connections in accordance with System Supplier-furnished drawings, instructions, and field supervision to ensure proper connection. CONTRACTOR shall include the services of a System Supplier factory engineer to supervise making of connections to power supplies, motor leads, communication circuits, existing control equipment, and any other connections external to the new control equipment; adjust the equipment; initiate and check operation; instruct OWNER's electrician on operation and maintenance of the equipment; and place the equipment in operation in a manner fully satisfactory to ENGINEER. This will include on-site review of software/hardware controls from the central control point.

E. Any auxiliary interface relays and controls needed for completion of this project, if not specifically called for, shall be by System Supplier. All switches and control and indicating lights associated with the control panels shall be new and installed in the panels. All new telemetry equipment and controls shall be installed in new or existing as necessary by System Supplier supervisory control panels at locations where space allows for the new equipment in the remote stations and at the water treatment plant.

1.02 QUALITY ASSURANCE

A. System Suppliers: Firms regularly engaged in the design and manufacture of SCADA systems of the size and complexity specified herein, and whose systems have been in satisfactory use in similar service for not less than 10 years.

B. Installer: A firm with at least 10 years of successful installation experience on projects with SCADA system design and installation work similar to that required for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide control panels, power supplies, controllers, relays, wire, and connectors that have been listed and labeled by Underwriters Laboratories.

E. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's Standard of Installation.

1.03 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.

B. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

C. Provide product data on all equipment and devices specified herein as well as wiring schematics for all systems.

D. Shop drawing submittals shall include the following information shall be provided in booklet form:
   1. Detailed catalog information, descriptive literature, and specifications of hardware. **All items being provided must be specifically noted on this literature.**
   2. All field devices and instruments.
   3. Project implementation plan, including information on project organization, project management, engineering, programming, configuration, training, start-up, and maintenance services. Plan shall include key personnel on project, point of contact, and communication protocol.
   4. Update to existing overall network schematic showing all new controllers, radio, and hardware addresses applicable to the system.
   5. Wiring diagrams for all SCCs , including modification drawings for existing equipment. **Existing SCC wiring diagrams shall be electronically redrawn and shall include modifications new and existing equipment as specified herein.**
   6. PLC I/O Listing.
   7. Database with PLC addresses.
   8. Software.
   9. PLC programs and software.
   10. Control narratives.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provision of Section 01300-Submittals.

B. Include spare parts data listing, source and current prices of replacement parts and supplies, and recommended maintenance procedures and intervals.

C. Submit Operation and Maintenance Manuals in accordance with Division 1. The following additional information shall apply:
   1. Manuals shall contain, but not be limited to, the following:
      a. System Hardware.
      b. System Software.
   2. Hardware section shall include:
      a. Safety precautions, physical description, functional description, operating procedures, theory of operation, maintenance instructions, checkout procedures, troubleshooting procedures, servicing, and removal and replacement procedures.
      b. Wiring schematic and logic diagrams, parts list, and point-to-point wiring.
      c. Listing of all hardware timers installed in SCCs, as well as the ranges set on each timer. Listing shall also include actual timer setting after completion of start-up.
   3. Software section shall include program documentation (i.e., PLCs, radios, OITs), which shall include programs, documentation files, database and configuration as installed. Provide two copies of backup disks of this information. Passwords for all programmable devices (i.e., PLCs, radios, OITs) shall be turned over to OWNER at the time of final completion.

1.05 DELIVERY, STORAGE, AND HOLDING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to SCC components, enclosure, and finish.

1.06 CONTRACTOR AND SYSTEM SUPPLIER GENERAL REQUIREMENTS

A. Components, peripherals, interconnections, cabling, power supplies, software, and services necessary to form a complete, integrated system shall be identified and provided by CONTRACTOR. CONTRACTOR shall be responsible for reviewing the wiring diagrams and control sequences for equipment provided under other divisions of these specifications and coordinating all interface requirements. CONTRACTOR shall submit to ENGINEER, in writing, any deficiencies noted during this review. Any changes required by CONTRACTOR because of failure to complete this review shall be the responsibility of CONTRACTOR, at no increase in cost to OWNER.

B. CONTRACTOR shall be responsible for complete coordination in providing all equipment, sensors, and meters supplied with input and output signals, and contacts that are compatible with the systems as specified herein. CONTRACTOR shall also be responsible for complete coordination with manufacturers of other systems specified in other divisions of these specifications with which an interface is required. The Contract drawings and I/O Listing are symbolic representatives of the required work. It is not intended that the drawings show all appurtenances. CONTRACTOR shall provide a complete and working system according to the true intent and meaning of the drawings, specifications, and standard industry practices.

C. To ensure a complete and totally integrated system, a single manufacturer who has experience in furnishing similar networked PLC-based monitoring and control systems of the same complexity and size for municipal water distribution facilities shall provide specified equipment and services. The system proposed to meet this specification shall be of field-proven design, incorporating manufacturer's standard equipment and software. Service of all peripheral devices shall be provided by the manufacturer of the process monitoring and control system.

D. Design and specification of devices and completed system shall conform to applicable portions of the latest edition of National Electrical Code (NEC).

E. Control panels shall bear a serialized UL label indicating that it is UL approved as an assembled unit. Panels that have individual components that are UL labeled, but do not have UL approval as an assembled unit are not acceptable.

F. Training Program:
   1. Submit training plan including course syllabus, personnel who will be conducting the training, and schedule.
   2. Provide materials, instructors, and workbooks to complete the training.
   3. Training courses shall include: Operator training. Course length minimum 4 hours. Training shall utilize equipment specified herein following installation and field testing.
   4. Manufacturer's training shall be directed to system and equipment operation, maintenance, troubleshooting, and equipment and system-related areas other than the process itself.

G. System Supplier shall meet the following minimum requirements:
   1. System Supplier shall have a full-time staff of qualified programmers who are knowledgeable in the configuration of networked computer systems and the PLCs being provided.
   2. System Supplier shall have training capabilities and shall have conducted training courses in programming and maintenance.
   3. System Supplier shall have an adequate inventory of spare parts.
   4. System Supplier shall have a full-time staff of qualified service technicians.
   5. System Supplier shall be responsible for the programming and documentation of the system.
   6. System Supplier shall be responsible for all details that may be necessary to properly install, wire, adjust, and place in operation a complete and working system.
   7. System Supplier shall be responsible for all coordination between the system and the field devices, instrumentation equipment, and equipment furnished with other divisions of this specification. This shall include interface with existing equipment.

H. All components are to be standard make acceptable to OWNER, with one manufacturer to provide all similar components. The Base Bid Supervisory System System Supplier shall be Instrument Control Systems, (763) 559-0568.

1.07 SYSTEM START-UP AND SUPPORT SERVICES

A. Permit ENGINEER and OWNER to observe vendor's staging records or other quality assurance records relating to system(s) supplied.

B. After being notified by CONTRACTOR that the equipment has been installed and is in full operating condition and ready for test, ENGINEER will make a one-day trip to check operation.

C. Final acceptance and payment will not be made until the system has operated satisfactorily for a minimum of 30 consecutive days. CONTRACTOR shall include in Bid field follow-up to ensure proper adjustments and operation during the first year following project final completion. Prior to beginning the 30-day test, the following criteria shall be met:
1. Satisfactory operation of I/O control loops.
2. Satisfactory operation of software.
3. Satisfactory operation of control program.
4. Satisfactory operation of peripheral equipment.
5. The necessary debugging programs have been performed.
6. Data output is reliable.
7. Control loops are operational.
8. Checking and calibrating of systems have been completed.
9. Reports are operational and give correct data.

D. CONTRACTOR, through System Supplier, shall provide the following support services:
1. Field Service Engineer: Field service engineer shall be responsible for programming of system PLCs at the site. Field service engineer shall be present for start-up of all systems and available throughout the entire construction process until final completion. Service technicians sent for system start-up will not be acceptable. Support shall include on-site time. Services shall include, but not be limited to:
   a. Commissioning, installation, start-up, and testing of equipment.
   b. Revising or rewriting manuals to incorporate an installed and accepted system.
   c. On-site training.
   d. Software modifications.
2. In-factory support shall include consultation following the acceptance testing and shipment. Services shall include, but not be limited to:
   a. Researching and answering questions related to the system operation, documentation, and system use and functions.
   b. Program modifications.
   c. Revising or rewriting manuals.
3. Post-start-up support shall include follow-up services during the 1-year period following final acceptance. Service shall include follow-up recalibration and replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by OWNER. This shall include 24 hours for work on-site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve the operation of the system. It shall be assumed that this 24 hours includes two trips to the site.

1.08 EQUIPMENT ENCLOSURES

A. New enclosures shall be front access only, minimum No. 12 gauge steel, and continuous-hinged doors, rotating lockable handle with latch on each supervisory equipment compartment door (not screws or bolts), with top and bottom bolts actuated by one rotating handle on large doors. Provide door stop kit for all panel doors, and data pockets for wiring diagrams. Painting shall include phosphate treatment, zinc chromate iron oxide primer, baked rust-inhibiting enamel, White interior,

and OWNER-selected exterior color. All doors and panels shall be gasketed. New enclosures shall be manufactured by Hoffman, Lehman, or Saginaw

B. Indication gauges shall be at eye level, minimum 48 inches, maximum 60 inches, from floor to bottom of gauge.

C. Plastic wiring troughs shall have removable covers. **Maximum fill for wiring troughs shall be 60%.** All wiring in supervisory enclosures and control panels not in wiring troughs shall be bound with continuous-type spiral windings. Terminal strips located adjacent to wiring troughs, relays, fuses, PLCs, etc., shall have a minimum of 1 1/2 inches between terminal strip and wiring trough.

D. Tubing and instruments containing water shall be in separate compartments located and constructed so that leakage or spray at 100 psi pressure cannot touch electrical conductors or devices. Leakage shall be conducted to the floor in duct or pipe.

E. All wiring for new panels shall be done in the factory, Class II, Type C with master terminal strips for exterior connections. Terminal strips shall be located either at the bottom or on the side of the enclosure, depending on where the I/O conduits penetrate the enclosure. Splices are not allowed within enclosures or wireways. All enclosures must pass through doors to point of installation, and if enclosures are shipped in sections, all wiring and connections between sections shall be done by CONTRACTOR. All wiring shall be labeled at each end with corresponding numbers. This numbering shall be shown on the shop and record drawings.

F. All door-mounted devices shall be furnished flush-mounted, and an exterior-engraved phenolic nameplate worded by OWNER (upon receipt of shop drawings) shall be provided for each compartment, device, and light. All components within the enclosures shall be identified with interior-mounted engraved labels. Labels shall be installed on the enclosure back panel and not on the device or wireway. Devices shall be grouped for each device or unit being controlled.

G. All panels with DIN rail-mounted equipment shall include a minimum of 25% spare DIN rail space.

H. In addition to spare I/O specified herein, provide a minimum of 25% spare hot and neutral terminals wired to terminal strips. Spares shall be provided for all voltage sources within the panel (e.g., 120 V, 24 V).

1.09 COMMON REQUIREMENTS ALL EQUIPMENT

A. All indicating and recording devices shall be electric or electronic.

B. All motor control power shall be 120 volts with suitable circuit protection (fuses or breakers). Fuse holders shall be provided with integral LEDs to indicate when the fuse is blown.

C. Devices powered at 120 volts from supervisory control panels shall be fused. This shall include, but not be limited to, motor-operated valves, flowmeters, and transducers.

D. Provide lightning protection, isolation transformers, and fused disconnects at each end of each power circuit, supervisory circuit, and local supervisory circuit with transformers and relays, if necessary, to obtain supervisory power. 120-volt power shall be available at all control points. Lightning protection shall be completely solid-state and self-healing and shall not require the use of fuses. Provide a single switch with an indicating light to deenergize the control power for each location. Each panel shall have a GFI, duplex, 20 ampere, 120-volt receptacle.

E. If enclosure and panel space is needed for future installation of devices and lights, the enclosure and panel shall be constructed for such installation. Supports shall be provided for future equipment, and panel openings shall be made and covered with neat cover plates matching the panel.

F. Where equipment is necessary to perform a function as called for in one part of this specification, it shall be provided, even though the detailed enumeration at various control points may omit listing that equipment.

G. Where a certain accuracy of sensing and transmitting levels or flows and controlling operations are called for, means must be provided to read or determine that the levels or flows are within the limits or accuracy specified of the sensing, transmitting, and controlling devices. Where no accuracy is specified, but a knowledge of levels is necessary to set operating points, an indicating device of accuracy consistent with the operation of the system is required.

H. All control and auxiliary relays shall have indicating LEDs. All timing relays shall have On and timing Out LEDs.

I. A condensation heater shall be provided in all control panels located outdoors. Condensation heater shall be as manufactured by Hoffman Model DAHX001, or equal, sized based on control panel and exterior temperature.

2.0 MISCELLANEOUS PRODUCTS

2.01 PRESSURE SWITCHES

A. Pressure switches where called for shall be Square D, Type GAW for pressures as applicable.

2.02 PRESSURE TRANSDUCERS

A. Pressure transducers shall sense gauge pressure and provide a 4-20 mAdc signal proportional to the sensed pressure. Transducers shall meet requirements as specified in respective contract drawings.

2.03 PROGRAMMABLE CONTROLLER

Listed hardware and/or software is to establish basic major components only. Any required related ancillary devices shall be provided by the integrator at no additional cost to the owner.

A. Water Office SCADA Master Terminal Unit (MTU):

Manufacture : Allen-Bradley or approved equal
CompactLogix 5370 L3 1769 Series Programmable Logic Controller System. To include chassis power supplies and I/O modules as required. Communications cables ancillary devices as required

B. SCADA Remote Terminal Unit (RTU):

Manufacture : Allen-Bradley or approved equal
Micro850 or higher Programmable Logic Controller Systems
To include chassis power supplies and I/O modules as required
To include communications cables ancillary devices as required

C. PLC Spare Inputs / Outputs

Provide 25 percent spare capacity (minimum) on all inputs and outputs. Provide extra terminal blocks and extra I/O modules as required to meet this minimum requirement. All PLC I/O shall be wired to field terminal.

D. MTU/RTU Remote Radio Communications

i. The MTU shall communicate using radio/modem communications and shall continuously poll the remote RTU sites in sequential order based on programmable time intervals. The system shall update all system remote site data points at intervals of no less than 120 seconds under normal conditions.

ii. Each RTU site shall the ability to be individually removed from the poll sequence via the SCADA HMI. The SCADA HMI shall graphically indicate each RTU Enabled/Disable Status.

iii. The SCADA HMI shall also indicate:
   a. Each remote sites current radio communications health status: (Normal/Failed)
   b. Total number of communications attempts to each remote site
   c. Number of successful communications attempts to each remote site
   d. Percentage of successful communications attempts to each remote site
   e. Radio communications counters shall be able to be reset by the Operator via the HMI

2.04 SCADA HMI SOFTWARE

HMI software shall be FactoryTalk View platform by Rockwell Automation. All software shall be of the latest version. All new software shall be provided with factory Media (CD or USB) and be provided to the owner at jobs end. All software shall be registered to the owner and become the property of the owner at jobs end. All HMI, OIT or other project files shall be provided to the owner at jobs end. All programs shall include complete documentation with no passwords or lockouts.

Provided software shall be installed on associated provided computers, fully functional and available to the plant IP network. All provided HMI and related software shall include a one-year support option. This support option shall allow no cost version updates and web based factory support for the duration of the support. All software support shall be available for continuation by the owner as an option. The support contract time line shall start at the point of substantial completion of related SCADA PC hardware and software upgrades.

2.05 SCADA HMI SOFTWARE DEVELOPMENT

A. Application Screens

HMI graphics shall be representative of the OWNERS system. All locations and devices shall be clearly identified. Application screens shall be developed to graphically represent all applicable distribution site equipment data status points for comprehensive display and use by the OWNER. A system overview screen will be provided that will graphically depict the overall system. Using the mouse to select a particular section will display the associated detailed screen(s) for the select equipment, e.g. tank levels, pumps stations, valve stations, master meter stations, etc. A screen will be provided for each remote site to graphically depict the operation. Equipment status will be indicated by color changes to the representative equipment graphic. Pumps, Blowers, valves, etc., will be displayed as green when de-energized or closed, red when energized or opened and flashing yellow when faulted. A trend screen will be provided for each remote site to graphically depict the real-time and historical values. Like trend points may be combined to show common pressure zones, flow rates or similar for ease of use. Trends are to be scaled for appropriate engineering unit values for ease of viewing and allow zooming in and out for details. Trends shall default to 24 hours x-axis and allow forward and reverse movement for viewing of historical data. Historical trend data shall be logged for viewing a 5-minute intervals and stored for up to 36 months on the local workstation.

- Analog Data Trends: e.g. : tank levels, system pressures, flow rates
- Discrete Data Trends: e.g. : pump run events, valve open close events

B. Alarming

The SCADA workstation HMI software shall be developed to indicate alarm status of applicable data points. New alarms shall flash on the HMI alarm banner when active. Upon alarm acknowledgment by the user, the alarm shall stop flashing and change colors to indicate if it is still active. All alarms shall be time and date stamped to indicate the time of the alarm event and time the alarm event was cleared. An alarm history shall be logged to allow viewing previous alarms.

- Alarms shall include but not limited to the following as applicable: Tank level High/Low, Pump Fault, Valve position fail, Pressure High/Low, Station High Flow, RTU intrusion, Loss of radio communications.
- Critical alarms as designated by the OWNER shall be assigned to WIN911 for off-site alarming notification.

C. Reporting

The SCADA workstation HMI software shall log data to a database for use to develop and display tabular based reports for use by the plant operator. The report data shall be logged at intervals of no less than 60 minutes and be permanently stored on the local workstation. Data shall be logged and stored for a minimum of 36 months. The reports shall be configured to allow daily and monthly reports selectable by the plant operator. The reports shall be based on use of Microsoft Excel and generated via Sytech XLReporter. The reports shall be published to Adobe PDF on demand and stored to the local workstation.

Reported data shall be as noted:

- Master Meter Hourly Flow Total (all measured points)
- Master Meter Daily Flow Total (all measured points)
- Master Meter Monthly Flow Total (all measured points)
- Residual Chlorine Hourly Value (all measured points)
- Major Equipment Dailey Run Time Hours (all measured points)
- Five (5) Additional similar custom reports shall be available upon request by the owner at no additional fee.

2.06 SCADA COMPUTER HARDWARE

A. Dell Precision Tower 3000 Series Business Class Workstation Computer with 5 year "Pro-support" next business day manufacture warranty and accidental damage service coverage
B. 6th Gen Intel® Core™ i7 Processor
C. Windows version 7 64Bit professional operating system with Version 10 Pro License
D. Microsoft Office for small business
E. 32 GB RAM
F. Dual 1TB Hard Drive
G. 16X DVD+/-RW
H. Enhanced Keyboard
I. Laser Mouse
J. Dell 24" Professional monitor (1 Each per computer)
K. 1500 VA UPS with Automatic Voltage Regulation (1 Each per computer)

L. 4 TB External hard drive with automatic backup software (Installed and configured) Western Digital My Book Duo WDBFBE0040JBK-NESN or approved equal

M. Norton's Internet Security

2.07 SCADA COMPUTER PRINTER:

Epson WorkForce WF-7720 Wide-format All-in-One Printer, or approved equal, with standard ink cartridges. To include 1 Each spare ink cartridge of each type used.

2.08 NETWORKING EQUIPMENT

The Systems Integrator shall provide networking equipment for supplied control panels and SCADA HMI equipment for a working office IP control network. (ie: Network switches, media converters routers, power supplies and interface/patch panels)

2.09 OPERATOR INTERFACE TERMINAL (OIT)

Manufacture: Allen-Bradley Panelview 800 Series or approved equal. 6.5-inch minimum screen size. The OIT shall be completely configured and developed in a neat and Operator friendly manor to display all relative site data. Screens shall be graphically representative of each displayed equipment type.

2.10 RADIO COMMUNICATIONS

Wireless communications shall be accomplished using licensed VHF radio/modems. The integrator shall supply proper FCC licensing for the owner all sites and cover all associated fees. The license shall be effective for 10 years from the date of frequency assignment approval by the FCC. A one-year FCC construction notice fee and filing for all sites shall be included.

The supplier shall provide a computer-generated radio path study to determine recommend antenna heights and RF routing. The RF path study results must be provided with bid. Radio path study results shall indicate requirements for communications towers where required, and show projected RF paths with repeaters. Communications towers shall be provided as recommend by the control system integrator and installed by the contractor. If a specific tower height is not noted, a tower with a minimum height of 20 ft shall be provided. The tower is to be provided by the Systems Integrator and installed by the CONTRACTOR. If the radio path study results indicate the need for additional height at this location, the SCADA supplier shall include this in the bid to the contractor. The supplier shall be responsible for informing the contractor of proper locations and installation techniques of towers. Where applicable, the antenna may be mounted on a mast that is integral to the RTU mounting structure at a height of no less than 10 feet. All fade margin goals must be achieved regardless of antenna mounting type and height.

Antennas are to be located at appropriate heights as noted in the computer path study for a target fade margin of 25 dB or better at a RX threshold of -110 dB. An average foliage height of 80 ft shall be used in the RF path calculations.

A. Radio/Modem:
CalAmp Viper or ESTeem 195M series or pre-approved equal

B. Antenna:
Omni Directional: Celwave, Sinclair Technologies, Astron or approved equal
Yagi: Celwave, Astron or approved equal
Antenna system gain and type shall be as determined by path study and FCC requirements

C. Coaxial Cable and accessories:

- Coax Feedline: Times Microwave: LMR-400DB
- Coax end connectors: Times Microwave with EZ type "N" gold-plated pin with silver plate body
- Coax cable shall be secured at proper intervals to towers, mast, tank ladders or the like using Stainless Steel Mounting Clamps, Heavy Duty Nylon Outdoor Tie Straps or other means designed for securing coaxial cable. At all points where the straps or clamps contact the coax cable, a protective rubber cover shall be installed to prevent damage to the coax if required to prevent damage.
- Where securing coax to tank ladders, only ladder stand-off support shall be used. No coax shall be secured in a manner that may interfere with safety standards. Confirm installation methods with the owner and engineer prior to installation.
- Outdoor Nylon Tie Straps shall be Dymetec A—Acetal 1/2"(Delrin) wide by .050" thick. Operating Temp. -40-185 Deg F, UL Rating UL94HB, 400 Lb loop break strength

2.11 COMMUNICATIONS TOWERS

Towers to be free standing "tilt up" type and constructed of high quality aluminum. Properly sized base section shall be provided with tower. Tower to be sized by integrator for adequate regional wind loading for antenna type used. Tower heights to be determined by integrators pre-bid radio path study. Towers to be as manufactured by Universal Tower Inc.

Any required Local, State or Federal permitting and fees shall be administrated by the owner.

2.12 PRESSURE SENSORS

A. Tank Level Measurement

Non-submerged locations: .25 % accuracy, 4-20 mA, Loop Powered 12-32 VDC, Stainless Steel or Aluminum NEMA 4X Housing, Digital Display with push button configuration with scaling function, Manufacture: ABB, Siemens, Ashcroft or approved equal.

Submerged/Wet location: Submersible rating, Sealed sensor, .25 % accuracy, 4-20 mA, 9-30 VDC, Stainless Steel, Manufacture: Pressure Systems Inc., Keller-America or approved equal

Pump Station inlet/outlet pressure: .5 % accuracy, 4-20 MA, 9-30 VDC, Stainless Steel NEMA 4X. Manufacture: Pressure Systems Inc., Keller-America or approved equal

2.13 RTU ENCLOSURES

A. Outdoor or corrosive environment exposure:

- NEMA 4, Stainless Steel, Factory Painted White,
- Pad lockable handle required for outdoor units
- Continuous or 3-point hinge door with removable hinge pins
- Quarter-turn door latch
- Manufacture: Hoffman Concept SS, EXM or approved equal

B. Indoor non-corrosive environment exposure:

- NEMA 12, Factory Painted Steel
- Continuous or 3-point hinge door with removable hinge pins
- Quarter-turn door latch

- Manufacture: Hoffman Concept, EXM or approved equal

C. When applicable, the enclosures shall be supplied with adequate heating capacity for condensation protection and component temperature rating exposure. A thermostat shall be included for desired temperature control. Outdoor enclosures shall include ventilation if required to accommodate component temperature specification limits. Enclosures mounted outdoors shall include an interior swing panel for mounting of push buttons, switches, displays, etc. No buttons, displays, switches, etc., shall be exposed directly to outdoor weather conditions. Heaters shall be specifically designed for use in industrial control panels.

D. UL Listing:

Control panels shall be assembled by a company engaged in full time Water and Wastewater SCADA Systems Integration and production of assembled controls panels. The control panels are to be designed and built by the system supplier. Control panels shall be UL 508A listed for industrial control panels.

2.14 SURGE PROTECTION

A. Each control panel shall include equipment level surge protection for incoming 120VAC power.

- DIN Rail Mount
- Nominal discharge current: 20 kA
- Maximum discharge current: 40 kA
- UL 1449 4th Edition
- Replaceable Surge Module
- Fault Indicator
- Operating Temperature Range -40°C to 60°C
- Storage Temperature Range -40°C to 90°C
- Relative Humidity 0 to 95% non-condensing
- Manufacture: MGC, Citel DS42S-120 or approved equal

B. Analog points connected to devices outside of the RTU control panel shall be surge protected in the panel at the field termination point.

- DIN Rail Mount
- Nominal Operating Voltage 24VDC
- Maximum discharge current: 20kA
- UL 497B Edition
- Replaceable Surge Module
- Operating Temperature Range -10°C to 60°C
- Manufacture: MGC, Citel DLA-24D3, Phoenix Contact PlugTrab or approved equal

C. Analog devices located outside of the control panel shall be surge protected at the equipment Level. Devices with factory integrated surge protection may be used in lieu of separate external surge devices.

- Conduit Mount
- Nominal Operating Voltage 24VDC
- Maximum discharge current: 15kA
- Operating Temperature Range -10°C to 60°C
- Manufacture: Citel TSP15M, Pepperl + Fuchs or approved equal

D. RTU Coax Surge Protection:

- Bulkhead mount, NF-NF end connectors
- Manufacture: Polyphaser, Citel or approved equal

2.15 POWER SUPPLIES

A. 12 VDC:

- 7 Amp minimum continuous output rating @ 12 VDC
- Adjustable output 12-15 VDC
- DIN rail mountable
- Manufacture: Allen-Bradley, Sola, Mean-Well or approved equal

B. 24 VDC:

- 4 Amp minimum continuous output rating @ 24 VDC
- Adjustable output 24-30 VDC
- DIN rail mountable
- Manufacture: Allen-Bradley, Sola, Mean-Well or approved equal

2.16 UNINTERRUPTIBLE POWER SUPPLY

120VAC powered RTUs shall include and AC or DC UPS system sized to provide 60 minutes of backup runtime. Where the backup power is 120VAC, the RTU UPS shall include automatic voltage regulation (APC, Cyberpower or approved equal).

Where the backup power is 12 or 24VDC, the RTU shall include one or more battery packs with a regulated UPS controller with automatic switchover on loss of power (Sola, Allen-Bradley, Mean Well or approved equal).

2.17 SOLAR POWER STATION

Solar power station shall be designed to provide an estimated RTU run time of 36 hours. The station shall include a 130W Solar Module with 198 AH Battery Size minimum. Provide larger capacities as required to meet minimum runtime goals.

System to include hardware for Panel Mounting Structure, - Side-of-pole mounting structure – adjustable tilt. Fits 2" – 4" schedule 40 pipe; mounting hardware included.

Enclosure: NEMA 4X, Stainless steel or aluminum hardware; padlock latch; integrated mounting flange for 2" – 4" schedule 40 pipe. To include: DIN rail mounting of miscellaneous hardware, fuses, battery, battery charge controller with low voltage disconnect, system wiring, grounding terminals for a complete and assembled system.

2.18 CIRCUIT BREAKER

The RTU shall be fitted with one or more UL listed DIN rail mounted circuit breakers. The circuit breaker shall disconnect the RTU panel from all outside AC voltage sources. Manufactured by Allen-Bradley, Eaton or approved equal.

2.19 RTU PANEL WIRING

RTU panel wiring shall conform to high quality assembly standards. All components shall be UL listed where available. Panel wiring shall conform to standard color coding practices for easy identification. Color coding scheme shall be clearly stated on system drawings. All internal back plate wiring shall be laid in slotted wiring duct with matching cover. Duct shall be neatly installed in vertical and horizontal runs. Duct installed at angles other than vertical or horizontal shall not be accepted. Exposed wiring shall only be acceptable where wiring transitions to the intended device or termination point. All exposed wiring crossing door panels or similar transitions shall be wrapped in plastic wire wrap or flexible duct.

Proper grounding practice for personnel and equipment protection shall apply. All field wiring shall terminate at DIN rail mounted terminal strips. Direct field termination to RTU devices shall not be allowed. Terminal strips shall be feed through type rated @ 600 V/ 20 Amp. All terminals and wiring shall be clearly marked using machine printed permanent making labels. Hand written wire marker or panel ID labels are not acceptable. Wires shall be clearly identified at termination points and clearly identified on system drawings.

Individually fused components shall be required for the following:

- PLC AC supply power
- DC power supplies AC supplied power and DC power output
- Radio/Modem Power supply DC output
- DC Loop power to analog devices (Each individual 4-20mA Loop)
- Solar Array output
- DC Voltage UPS and Battery supply

2.20 TURBO FLOW METER

Turbine master meters are to be Badger "Recordall Turbo Series" or approved equal. Turbo meter to be equipped with a built-in strainer and test port. The meter shall include a submersible rated direct mount digital display with a two-wire loop powered 4 to 20 ma output to SCADA. Flow meter shall include integral or local surge protector for the 4-20ma current loop at or near the meter electronic register.

2.21 MAGNETIC FLOW METERS

A. The magnetic flow meters shall be suitable for measuring water flows in the range indicated in the table below. The magnetic flow meters shall consist of a flanged sensor with grounding rings and remote electronics. The tube shall be of 304 stainless steel with NSF certified hard rubber liner. Flanges shall be carbon steel and conform to ANSI B16.1, Class 150. The sensor shall have and IP68 rating.

B. Where meter bypass piping is not provided for in-line flow meters, provide one spool piece for each size meter to allow for removal and repair of the meter.

C. The meters shall utilize bipolar DC coil excitation or other means to automatically rezero. Meters shall be provided with grounding rings made of material compatible with electrode material. Electrodes shall be bullet nose, 316 stainless steel suitable for drinking water.

D. Power consumption shall not exceed 20 watts. The meter shall incorporate design features to minimize the effect of greasy (nonconductive) coatings or incorporate a means to automatically clean the electrodes during continuous operation. Meter accuracy shall not be affected by greasy coatings, and cleaning of the meter manually shall not be required.

E. Meter accuracy shall be ±0.5% of rate from 1.0 to 30.0 ft/sec and 0.1% of scale below 1.0 ft/sec when installed with the appropriate upstream and downstream pipe diameters. The meters shall be wet-calibrated in a primary flow laboratory traceable to the National Bureau of Standards. Transmitters and flow tubes shall be interchangeable.

F. The meter electronics (transmitter) shall be designed to operate on 120 Vac, 60 Hz. Connections at the flanged sensor shall be factory-potted to assure IP68 as installed ratings. Outputs shall be 4-20 mA into 800 ohms maximum and 24 Vdc scaled pulse, 0 to 2 Hz maximum, 150 ohms minimum, suitable for driving a solid-state counter. Pulse width and volume of flow per pulse shall be widely adjustable before or after installation to allow interface with PLC input cards and other devices. Meter electronics shall be installed in the SCC enclosure as indicated herein.

G. Outputs shall be field-adjustable for range changes. Response time or damping shall be adjustable from 0.8 to 8.0 seconds. The meters shall be operable in all liquids with 5.0 umhos/cm or more conductivity.

H. The meters shall include empty pipe detection and shall be rated for accidental submergence. Meters shall be capable of reading forward and reverse flow with analog/digital outputs and totalizers.

I. The magnetic flow meters shall be ABB WaterMaster or approved equal. Meters shall be sized to match the nominal pipe diameter in which they are installed. Provide cable, length as required, to reach the remote-mounted signal converter in the SCC enclosure; CONTRACTOR shall coordinate.

2.22 CHLORINE ANALYZERS

Chlorine Analyzers are to be Hach CLT10sc Total Chlorine Analyzer or approved equal. The analyzer shall include a submersible rated direct mount digital display with a two-wire loop powered to 4 to 20 mA output to SCADA.

3.0 FINAL DOCUMENTATION

Upon system completion, (3) copies of project documentation shall be supplied to the engineer for assembly of Owner's project documentation. Documents that have not changed from the submittal process will not require resubmittal. Field corrected or hand-written changes to documentation will not be acceptable for final documentation.

Documents to be included are:

- RTU panel drawings (Detailed wiring diagrams with termination points, panel component layout and identification)
- HMI and OIT screen shots
- Project instrumentation calibration and configuration data sheets
- Radio signal strength and data quality report.
- User manuals for all major equipment
- Detailed radio system network layout
- To include: antenna azimuth, as built signal strengths, repeater routing paths.

4.0 DEMONSTRATION & START-UP

Inspect each System for conformity and compliance of materials, equipment and construction. Inspect each installation for conformity with manufacturer's recommendations. Correct any discrepancies or improper conditions.

Loops: Check each loop from the end element to the respective control display. Include instruments, control devices, panels, termination cabinets, input/output cards and other devices in the loop to ensure proper operation.

Energize and verify correct operation of all components of each System. This operation includes verification of accuracy of all interconnecting wiring. Place System into operation including all System software, logic, and displays. Adjust all control loop components and parameters to provide stable control of System process. Check validity of all System alarm displays. Schedule inspection with Owner to approve and verify satisfactory compliance with this section.

5.0 SPARE PARTS

Provide the following listed spare parts:

(1 Ea.) PLC processer each type used
(1 Ea.) PLC chassis each type used
(1 Ea.) PLC power supply each type used
(1 Ea.) PLC I/O module and end termination cap each type used
(1 Ea.) DC power supply each type used
(1 Ea.) DC-DC converter each type used
(1 Ea.) UPS each type used
(1 Ea.) UPS controller each type used
(1 Ea.) Solar Controller each type used
(5) Each Fuse-each type used
(5) Each Relay type used
(1 Ea.) Pressure transducer each type used
(1 Ea.) Surge protector each type used
(1 Ea.) Radio Modem

6.0 EXECUTION

A. Remote telemetry panels shall be factory wired, assembled, and tested with all transformers, logic circuits, terminal strips, and circuitry to provide control logic specified herein. All indicating lights, electronic indicators, etc. shall be installed on an inner front door for NEMA 4X panels.

B. UPSs installed in all SCCs shall be provided as specified herein with a relay I/O module that provides a dry contact output to the PLC in the event that the UPS batteries need replacement. Indication of "Replace UPS Battery" shall be provided at the SCADA system.

C. See project plans sheets for specific summary of work by site location.

END OF SECTION 16-940

SECTION 16-941

CONTROLS AND INSTRUMENTATION DRAWINGS

PART 1-GENERAL

1.01 SUMMARY

A. Work Included: Applicable provisions of Division 1 shall govern work in this section.

1.02 SUBMITTALS

A. Submit drawings in accordance with provisions of Section 01300-Submittals.

1.03 COORDINATION

A. The requirements set forth in this section are intended to apply to the drawings provided as specified in Section 16940-Controls and Instrumentation.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

3.01 GENERAL REQUIREMENTS

A. All drawings shall have the following information:
   1. Project information, including name of OWNER and specific project name.
   2. Drawing title, accurately representing what is on the drawing.
   3. Unique drawing identifier, consisting of a unique drawing number or drawing number with individual sheet number. If sheet numbers are used, total number of sheets must be identified on each sheet.
   4. System Supplier company name, address, and phone number.
   5. Original design information, including person responsible for design, date of original design, person responsible for checking of design, and date of design check.
   6. Revision block indicating revision number, date, description of revision, and person responsible for revision.

B. All drawings shall have line numbers that can be uniquely referenced from other drawings.

C. All drawings showing wiring shall include unique wire numbers assigned to wiring that is installed between devices in the panel. The wire number shall be shown on the drawings.

D. All drawings showing relays shall include reference to the drawings where the relay contacts are shown. Spare relay contacts that are not used shall be identified.

3.02 DRAWINGS REQUIRED

A. Index of Drawings: Index of Drawings shall list drawing number, sheet number (if applicable), and drawing title for each drawing in drawing package.

B. Symbol Sheet: Symbol Sheet shall include:
   1. Explanation of all symbols used on the drawings, including, but not limited to, normally open/normally closed contacts, flow switches, limit switches, pressure switches, selector switches, pushbuttons, timers, control relays, solenoids, fuses, circuit breakers, terminal blocks, and contactors. Symbol sheet does not need to be specific to project, but must contain

explanation of all symbols used on the drawings (i.e., special symbols used for a particular project must be added to standard symbol sheets).
2. List of abbreviations used on the drawings.
3. Explanation of continuation method for circuits that can not be shown on a single sheet.

C. Exterior Enclosure Layout Drawing: Exterior layout drawing shall show location of all externally-mounted equipment. Exterior layout drawing shall include:
1. Enclosure dimensions, enclosure NEMA rating (i.e., NEMA 1, NEMA 4X stainless steel, NEMA 4X nonmetallic, etc.), and enclosure color or finish.
2. Location and actual depiction of panel latches, hinges, mounting holes and lifting eyes.
3. Location and accurate representation of equipment mounted on enclosure (i.e., switches should look like actual switches being installed; indicating lights should look like actual lights being installed).
4. Equipment nameplate location.
5. Description for each piece of equipment or unique identifier and parts list, or bill of materials.
6. Nameplate list including nameplate wording, size, construction (i.e., lamicoid with Black background and White letters), and mounting method (i.e., stainless steel screws). Label size must include size in inches or reference to standard sizes included on symbol sheet, or elsewhere in drawing package.
7. Identification of area reserved for equipment located inside enclosure, but not actually mounted on enclosure back panel, such as UPS's, fiber optic patch panels, and lighting packages.

D. Interior Enclosure Layout Drawing: Interior layout drawing shall show location of all internally-mounted equipment. Interior layout drawing shall include:
1. Back panel dimensions and finish.
2. Location and accurate representation of equipment (i.e., terminal blocks should look like actual terminal blocks; receptacle should look like actual receptacle, etc.).
3. Dimensions of internally-mounted equipment are not necessary, but equipment should be drawn to scale such that an accurate representation of the way equipment will be mounted is shown on the drawing.
4. Description for each piece of equipment or unique identifier and parts list, or bill of materials.

E. Interconnection Diagram, Network Diagram or Block Diagram: Interconnection diagram, Network Diagram or Block Diagram shall show all cabling between system components and identify any station addressing or node numbers that are assigned to equipment. All cables shall be identified by cable type, including specific manufacturer and model/part number. Party responsible for furnishing and installing cable shall also be included. Some examples of cables that must be shown are:
1. Antenna cables.
2. Communications cables between system components (fiber and/or copper). This includes fiber optic jumpers between fiber patch panels and equipment, and Ethernet patch cables between switches and devices.
3. Communications cables (fiber and/or copper) between PLCs, controllers, operator interface equipment and security devices (e.g., card readers, electric strikes, and motion detectors) that are not shown on the elementary schematics.

F. Elementary Schematic: Elementary schematics shall be developed for each motor or supplied equipment and shall include:
1. Nominal voltage, AC or DC designation, number of phases (if AC), and frequency in hertz (if AC) for each source of electrical supply to the enclosure.
2. Prospective short-circuit current available at the point of electrical supply to the enclosure.
3. Type of power supply system grounding (e.g., wye phase midpoint grounded, delta phases corner grounded, wye phases midpoint grounded, delta phases ungrounded, etc.).
4. Complete documentation of electrical circuit from supply to motor or supplied equipment. Documentation shall include disconnecting means, main overcurrent protection (when supplied), branch overcurrent protection (when supplied), control circuit and special purpose control protection, motor control, overload protection, local disconnect (when supplied) and motor horsepower, and full load amps from nameplate or supplied equipment full load amps.
5. Documentation of PLC or controller inputs and outputs.

6. Documentation of all circuit breaker/motor protector ratings, fuse sizes, control power transformer VA ratings, dip switch settings, etc.

G. Wiring Diagram: Wiring diagrams shall show all terminations for all cables external to the enclosure. Terminations may be shown on the elementary schematics as long as the termination information is concise and easily understood by the personnel installing the field wiring. Termination information shall be shown for all devices, including devices that are not part of System Supplier's scope of supply. A box with two dots or continuation arrows indicating continuation to a piece of equipment are not acceptable.

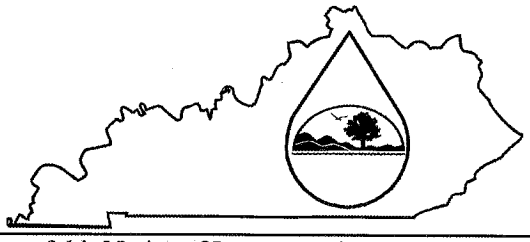
H. Calculations Summary: Calculations summary shall include calculations performed to:
   1. Determine size of UPS.
   2. Determine control power transformer sizing. Control power transformer sizing calculations may be generic based on typical circuits.

I. Functional Testing Recommendations: Testing recommendations shall include description of functional tests that must be performed by operators. Functional test description shall be included for UPS, indicating lights, and other devices whose condition can only be determined by testing.

END OF SECTION 16-941

APPENDIX 1

KPDES FORM NOI-SW



Kentucky Pollutant Discharge Elimination System
(KPDES)
Notice of Intent (NOI)
for Storm Water Discharges
Associated with Industrial Activity Under the
KPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a KPDES permit issued for storm water discharges associated with industrial activity. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM (See Instructions on back)

I. Facility Operator Information

Name:		**Phone:**	
Address:		**Status of Owner/Operator:**	
City, State, Zip Code:			

II. Facility/Site Location Information

Name:			
Address:			
City, State, Zip Code:			
County:			
Site Latitude: (degrees/minutes/seconds)		**Site Longitude: (degrees/minutes/seconds)**	

III. Site Activity Information

MS4 Operator Name:							
Receiving Water Body:							
Are there existing quantitative data?	Yes ☐ No ☐ **If Yes, submit with this form.**						
SIC or Designated Activity Code Primary		**2nd**		**3rd**		**4th**	
If this facility is a member of a Group Application, enter Group Application Number:							
If you have other existing KPDES Permits, enter Permit Numbers:							

IV. Additional Information Required FOR CONSTRUCTION ACTIVITIES ONLY

Project Start Date:		**Completion Date:**	
Estimated Area to be disturbed (in acres):			
Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans?		Yes ☐ No ☐	

V. Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed or Typed Name:			
Signature:		**Date:**	

Kentucky Pollutant Discharge Elimination System (KPDES)
Instructions
Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity
To Be Covered Under The KPDES General Permit

WHO MUST FILE A NOTICE OF INTENT (NOI) FORM

Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to a water body of the Commonwealth of Kentucky without a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the KPDES Storm Water General Permit. If you have questions about whether you need a permit under the KPDES Storm Water program, or if you need information as to whether a particular program is administered by the state agency, call the **Storm Water Contact, Industrial Section, Kentucky Division of Water at (502) 564-3410.**

WHERE TO FILE NOI FORM

NOIs must be sent to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601

COMPLETING THE FORM

Type or print legibly in the appropriate areas only. If you have any questions regarding the completion of this form call the **Storm Water Contact, Industrial Section, at (502) 564-3410.**

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility.

F = Federal M = Public (other than federal or state)
S = State P = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and complete street address, including city, state, and ZIP code.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges. If data is available submit with this form.

List, in descending order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other KPDES permits presently issued for the facility or site listed in Section II, list the permit numbers.

SECTION IV - ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION ACTIVITIES ONLY

Construction activities must complete Section IV in addition of Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION V - CERTIFICATION

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer,which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authroity to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

AARON B. KEATLEY
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

March 14, 2018

Ms. Linda Alexander
East Logan Water District
333 S. Franklin St
Auburn, KY 42206

RE: Phase VI System-Wide SCADA Improvements
Logan County, KY
East Logan Water District
AI #: 33995, APE20180001
PWSID #: 0710951-18-001

Dear Ms. Alexander:

We have reviewed the plans and specifications for the above referenced project. The plans include the construction of approximately 50 feet of 6-inch DIP and 50 feet of 4-inch DIP waterline along with the upgrade or installation of new master meters with SCADA equipment at approximately 18 sites throughout the East Logan Water System. This is to advise that plans and specifications for the above referenced project are APPROVED with respect to sanitary features of design, as of this date with the requirements contained in the attached construction permit.

If you have any questions concerning this project, please contact Mr. Mohammed Mohiuddin at 502-782-7020.

Sincerely,

Terry Humphries, P.E.
Supervisor, Engineering Section
Water Infrastructure Branch
Division of Water

TH: MM
Enclosures
C: McGhee Engineering Inc.

Distribution-Water Line Extension

East Logan Water District

Facility Requirements

Activity ID No.:APE20180001

PORT0000000035 (Phase VI System-Wide SCADA) 50 feet of 6-inch DIP and 50 feet 4-inch DIP waterline along with the upgrade or installation of new SCADA equipment at approximately 18 sites throughout the East Logan Water System.:

Narrative Requirements:

Condition No.	Condition
T-1	Construction of this project shall not result in the water system's inability to supply consistent water service in compliance with 401 KAR 8:010 through 8:600. [401 KAR 8:100 Section 5]
T-2	The public water system shall not implement a change to the approved plans without the prior written approval of the cabinet. [401 KAR 8:100 Section 4(3)]
T-3	A proposed change to the approved plans affecting sanitary features of design shall be submitted to the cabinet for approval in accordance with Section 2 of this administrative regulation. [401 KAR 8:100 Section 4(2)]
T-4	During construction, a set of approved plans and specifications shall be available at the job site. Construction shall be performed in accordance with the approved plans and specifications. [401 KAR 8:100 Section 3(1)]
T-5	Unless construction begins within two (2) years from the date of approval of the final plans and specifications, the approval shall expire. [401 KAR 8:100 Section 3(3)]
T-6	Upon completion of construction, a professional engineer shall certify in writing that the project has been completed in accordance with the approved plans and specifications. [401 KAR 8:100 Section 4(1)]
T-7	The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. [Recommended Standards for Water Works 8.2.1, Drinking Water General Design Criteria IV.1.a]
T-8	Water lines should be hydraulically capable of a flow velocity of 2.5 ft/s while maintaining a pressure of at least 20 psi. [Drinking Water General Design Criteria IV.1.b]
T-9	The normal working pressure in the distribution system at the service connection shall not be less than 30 psi under peak demand flow conditions. Peak demand is defined as the maximum customer water usage rate, expressed in gallons per minute (gpm), in the pressure zone of interest during a 24 hour (diurnal) time period. [Drinking Water General Design Criteria IV.1.d]
T-10	When static pressure exceeds 150 psi, pressure reducing devices shall be provided on mains or as part of the meter setting on individual service lines in the distribution system. [Drinking Water General Design Criteria IV.1.c]
T-11	The minimum size of water main in the distribution system where fire protection is not to be provided should be a minimum of three (3) inch diameter. Any departure from minimum requirements shall be justified by hydraulic analysis and future water use, and can be considered only in special circumstances. [Recommended Standards for Water Works 8.2.2, Drinking Water General Design Criteria IV.2.b]

PORT0000000035 (Phase VI System-Wide SCADA) 50 feet of 6-inch DIP and 50 feet 4-inch DIP waterline along with the upgrade or installation of new SCADA equipment at approximately 18 sites throughout the East Logan Water System.:

Narrative Requirements:

Condition No.	Condition
T-12	Water mains not designed to carry fire-flows shall not have fire hydrants connected to them. [Recommended Standards for Water Works 8.4.1.b]
T-13	Flushing devices should be sized to provide flows which will give a velocity of at least 2.5 feet per second in the water main being flushed. [Recommended Standards for Water Works 8.2.4.b, Recommended Standards for Water Works 8.4.1.b]
T-14	No flushing device shall be directly connected to any sewer. [Recommended Standards for Water Works 8.2.4.b, Recommended Standards for Water Works 8.4.1.b]
T-15	Pipe shall be constructed to a depth providing a minimum cover of 30 inches to top of pipe. [Drinking Water General Design Criteria IV.3.a]
T-16	Water mains shall be covered with sufficient earth or other insulation to prevent freezing. [Recommended Standards for Water Works 8.7]
T-17	A continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones found in the trench shall be removed for a depth of at least six inches below the bottom of the pipe. [Recommended Standards for Water Works 8.7]
T-18	Water line installation shall incorporate the provisions of the AWWA standards and/or manufacturer's recommended installation procedures. [Recommended Standards for Water Works 8.7]
T-19	All materials used for the rehabilitation of water mains shall meet ANSI/NSF standards. [Recommended Standards for Water Works 8.1]
T-20	Packing and jointing materials used in the joints of pipe shall meet the standards of AWWA and the reviewing authority. [Recommended Standards for Water Works 8.1]
T-21	All tees, bends, plugs and hydrants shall be provided with reaction blocking, tie rods or joints designed to prevent movement. [Recommended Standards for Water Works 8.7]
T-22	All materials including pipe, fittings, valves and fire hydrants shall conform to the latest standards issued by the ASTM, AWWA and ANSI/NSF, where such standards exist, and be acceptable to the Division of Water. [Recommended Standards for Water Works 8.1]
T-23	Water mains which have been used previously for conveying potable water may be reused provided they meet the above standards and have been restored practically to their original condition. [Recommended Standards for Water Works 8.1]

PORT0000000035 (Phase VI System-Wide SCADA) 50 feet of 6-inch DIP and 50 feet 4-inch DIP waterline along with the upgrade or installation of new SCADA equipment at approximately 18 sites throughout the East Logan Water System.:

Narrative Requirements:

Condition No.	Condition
T-24	Manufacturer approved transition joints shall be used between dissimilar piping materials. [Recommended Standards for Water Works 8.1]
T-25	Pipes and pipe fittings containing more than 8% lead shall not be used. All products shall comply with ANSI/NSF standards. [Recommended Standards for Water Works 8.1]
T-26	The minimum size of water main which provides for fire protection and serving fire hydrants shall be six?inch diameter. [Recommended Standards for Water Works 8.2, Drinking Water General Design Criteria IV.2.a]
T-27	Gaskets containing lead shall not be used. Repairs to lead?joint pipe shall be made using alternative methods. [Recommended Standards for Water Works 8.1]
T-28	Pipe materials shall be selected to protect against both internal and external pipe corrosion. [Recommended Standards for Water Works 8.1]
T-29	Dead end mains shall be equipped with a means to provide adequate flushing. [Recommended Standards for Water Works 8.2]
T-30	The hydrant lead shall be a minimum of six inches in diameter. Auxiliary valves shall be installed on all hydrant leads. [Recommended Standards for Water Works 8.4.3]
T-31	A sufficient number of valves shall be provided on water mains to minimize inconvenience and sanitary hazards during repairs. [Recommended Standards for Water Works 8.3]
T-32	Wherever possible, chambers, pits or manholes containing valves, blow?offs, meters, or other such appurtenances to a distribution system, shall not be located in areas subject to flooding or in areas of high groundwater. Such chambers or pits should drain to the ground surface, or to absorption pits underground. The chambers, pits and manholes shall not connect directly to any storm drain or sanitary sewer. Blow?offs shall not connect directly to any storm drain or sanitary sewer. [Recommended Standards for Water Works 8.6]
T-33	At high points in water mains where air can accumulate provisions shall be made to remove the air by means of air relief valves. [Recommended Standards for Water Works 8.5.1]
T-34	Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur. [Recommended Standards for Water Works 8.5.1]

PORT0000000035 (Phase VI System-Wide SCADA) 50 feet of 6-inch DIP and 50 feet 4-inch DIP waterline along with the upgrade or installation of new SCADA equipment at approximately 18 sites throughout the East Logan Water System.:

Narrative Requirements:

Condition No.	Condition
T-35	The open end of an air relief pipe from automatic valves shall be extended to at least one foot above grade and provided with a screened, downward?facing elbow. [Recommended Standards for Water Works 8.5.2.c]
T-36	Discharge piping from air relief valves shall not connect directly to any storm drain, storm sewer, or sanitary sewer. [Recommended Standards for Water Works 8.5.2.d]
T-37	Water pipe shall be constructed with a lateral separation of 10 feet or more from any gravity sanitary or combined sewer measured edge to edge where practical. If not practical a variance may be requested to allow the water pipe to be installed closer to the gravity sanitary or combined sewer provided the water pipe is laid in a separate trench or undisturbed shelf located on one side of the sewer with the bottom of the pipe at least 18 inches above the top of the gravity sanitary or combined sewer pipe. [Drinking Water General Design Criteria IV.3.b]
T-38	Water lines crossing sanitary, combined or storm sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sanitary, combined or storm sewer with preference to the water main located above the sanitary, combined or storm sewer. [Drinking Water General Design Criteria IV.3.c]
T-39	At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. [Recommended Standards for Water Works 8.8.3.b]
T-40	There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the system. [Recommended Standards for Water Works 8.10.1]
T-41	Water utilities shall have a cross connection program conforming to 401 KAR 8. [Recommended Standards for Water Works 8.10.1]
T-42	Installed pipe shall be pressure tested and leakage tested in accordance with the appropriate AWWA Standards. [Recommended Standards for Water Works 8.7.6]
T-43	New, cleaned and repaired water mains shall be disinfected in accordance with AWWA Standard C651. The specifications shall include detailed procedures for the adequate flushing, disinfection, and microbiological testing of all water mains. In an emergency or unusual situation, the disinfection procedure shall be discussed with the Division of Water. [Recommended Standards for Water Works 8.7.7]
T-44	A minimum cover of five feet shall be provided over pipe crossing underwater. [Recommended Standards for Water Works 8.9.2]

PORT0000000035 (Phase VI System-Wide SCADA) 50 feet of 6-inch DIP and 50 feet 4-inch DIP waterline along with the upgrade or installation of new SCADA equipment at approximately 18 sites throughout the East Logan Water System.:

Narrative Requirements:

Condition No.	Condition
T-45	Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding for pipes crossing underwater. [Recommended Standards for Water Works 8.9.2.b]
T-46	Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source for pipes crossing. [Recommended Standards for Water Works 8.9.2.c]

CONSTRUCTION PLANS

for the

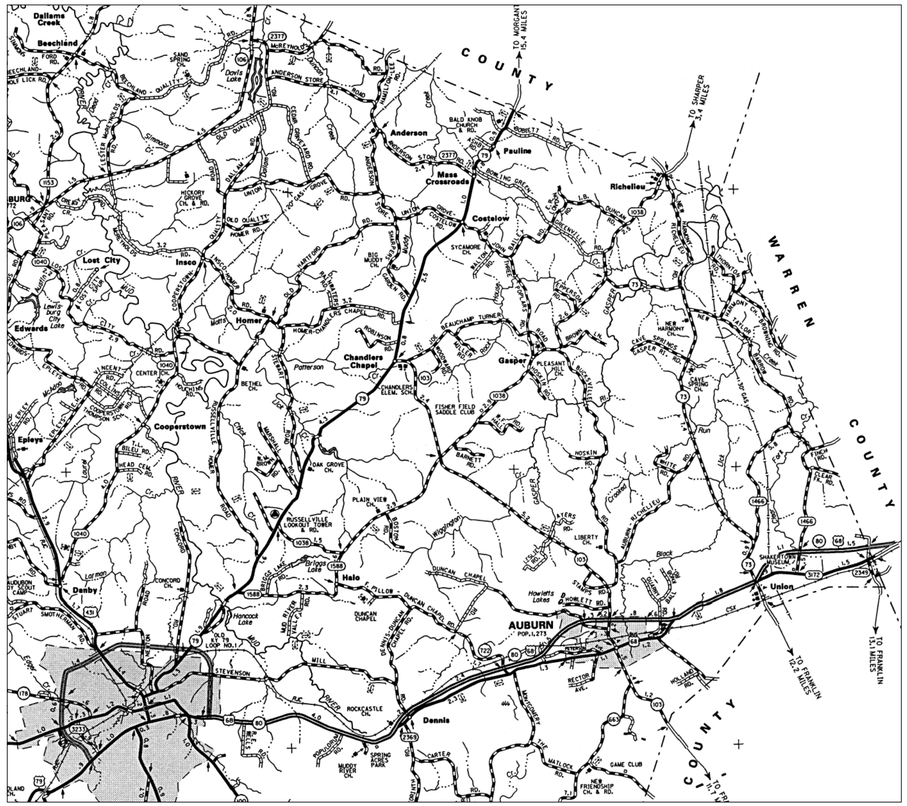
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS PROJECT

by the

East Logan Water District

Logan County, Kentucky

LOCATION MAP



Owner

Harris Dockins, Chairman
Carroll Browning, Commissioner
Lloyd Houchens, Commissioner

East Logan Water District
333 South Franklin Street
Russellville, Kentucky 42276
(270) 717-0991

Engineer

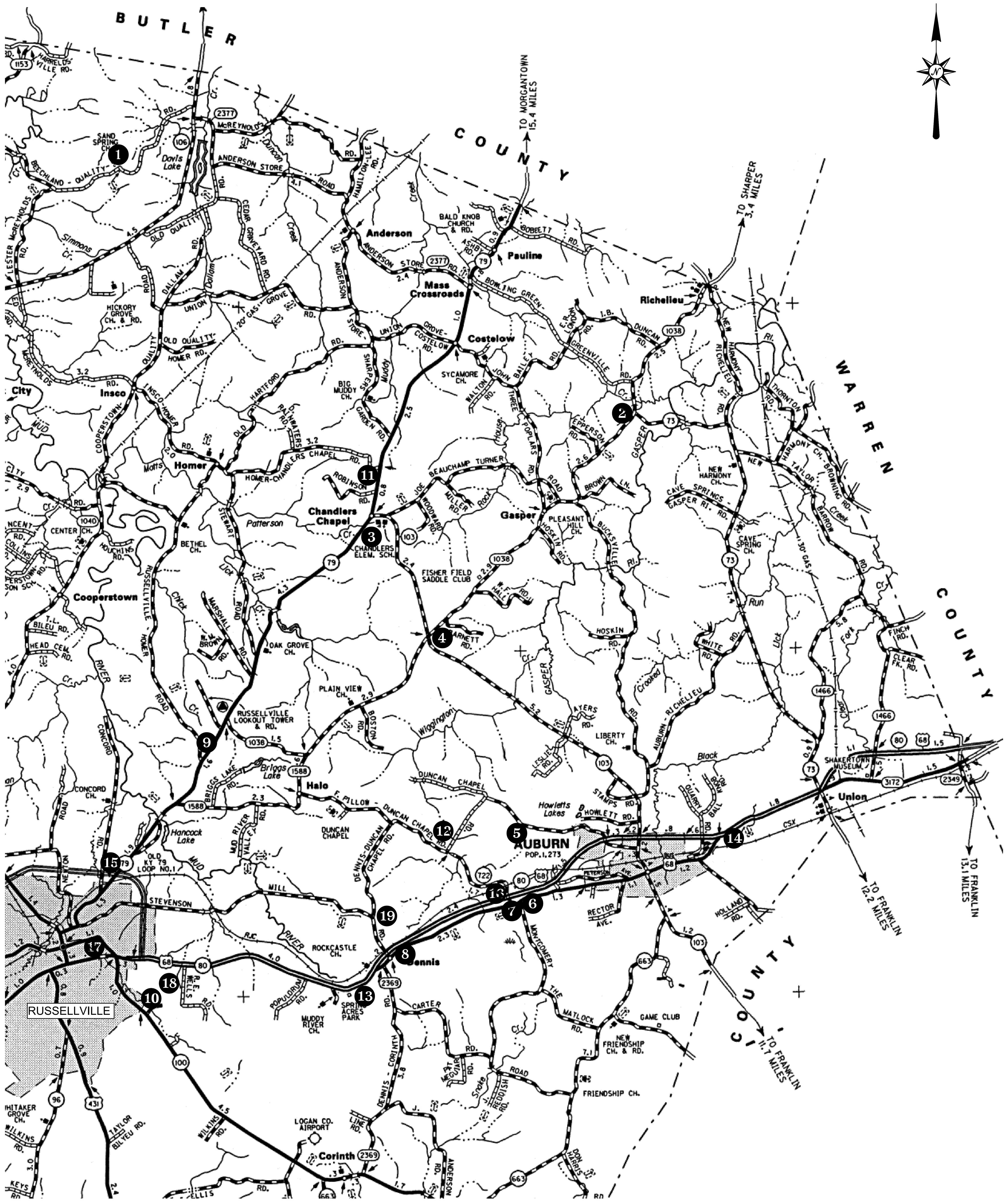
McGhee Engineering, Inc.
202 Ewing St, P.O. Box 267
Guthrie, Kentucky 42234
(270) 483-9985

No	Revision	Date	By
3			
2	FOR CONSTRUCTION	06-01-18	CWW
1	FOR KDOW REVIEW	02-14-18	CWW

REVISIONS

MARCH 2018

SHEET INDEX



EXISTING EAST LOGAN MASTER METER SITES								
Map ID	MASTER METER NAME	LOCATION BY ROADWAY	LATITUDE	LONGITUDE	Replace Turbo Meter? Y/N	Correct Drainage Issue? Y/N	New Precast Vault Req'd? Y/N	Power Source & Notes
1	Beechland Master Meter #1 East	Beechland-Quality Road near Tank	37° 2'2.54"N	86°52'4.26"W	Y (4")	N	N	Hard Wired back to Tank Site
2	Bucksville II Master Meter	KY Highway 1038 near KY Highway 73	36°58'10.39"N	86°43'3.96"W	Y (4")	N	N	Solar (Existing)
3	Chandlers Master Meter	KY Highway 79 (South of KY 103)	36°56'53.90"N	86°47'39.33"W	Y (4")	Y	N	Solar (Existing)
4	Bucksville I Master Meter	KY Highway 1038 @ KY Highway 103	36°55'11.69"N	86°46'38.36"W	Y (4")	Y	Y	AC (WRECC) **{New}**
5	Cemetery North Maser Meter	Cemetery Road near Tank	36°52'29.52"N	86°45'5.13"W	Y (4")	N	N	Hard Wired back to Tank Site
5	Cemetery South Master Meter	Cemetery Road near Tank	36°52'29.52"N	86°45'5.13"W	Y (4")	N	N	Hard Wired back to Tank Site
6	Montgomery Master Meter	Echo Valley Road @ Outdoor Furniture	36°51'19.95"N	86°45'0.06"W	Y (4")	N	N	Solar (Existing)
7	Friendship Master Meter	Echo Valley Road @ Body Shop	36°51'16.91"N	86°45'7.92"W	Y (4")	N	N	Solar (Existing)
8	Dennis/Corinth Master Meter	Echo Valley Road @ Dennis	36°50'31.67"N	86°47'20.96"W	Y (4")	N	Y (Dual)	AC (WRECC) **{New}**
8	Dennis Master Meter	Echo Valley Road @ Dennis	36°50'31.67"N	86°47'20.96"W	Y (4")	N	Y (Dual)	AC (WRECC) **{New}**
9	Homer Master Meter	Homer Road @ KY Highway 79	36°53'27.26"N	86°50'43.70"W	Y (3")	Y	N	Solar (Existing)
10	KY Highway 100 Master Meter	KY Highway 100 @ Tom Graham Road	36°49'49.19"N	86°51'39.05"W	Y (4")	Y	N	Solar (Existing)
11	ELWD: Chandlers BPS Site	KY 79 @ Homer Chapel Road	36°57'37.86"N	86°47'29.36"W	Y (3" Mag)	N	N	AC (WRECC)
12	ELWD: Duncan Chapel BPS	Duncan Chapel Rd @ Floyd Gipson Rd.	36°52'5.74"N	86°46'26.95"W	N	N	N/A	AC (WRECC)

PROPOSED OR ALTERNATE EAST LOGAN MASTER METER ADDITIONS								
Map ID	MASTER METER NAME	LOCATION BY ROADWAY	LATITUDE	LONGITUDE	New Meter Turbo/Mag?	Drainage Issue? Y/N	New Precast Vault Req'd? Y/N	Power Source & Notes
1	Beechland Master Meter #2 West	Beechland-Quality Road near Tank	37° 2'3.98"N	86°52'4.24"W	Magnetic (4")	N	Y	AC (Utilize Existing @ Tank)
5	Cemetery Tank Master Meter	Cemetery Road @ Tank	36°52'22.68"N	86°45'10.26"W	Magnetic (4")	N	Y	AC (Utilize Existing @ Tank)
11	KY Highway 79 North	KY 79 @ Homer Chapel Road	36°57'37.86"N	86°47'29.36"W	Turbo (4")	N	Y	AC (Utilize Existing @ BPS)
13	Dennis Tank Area Master Meter	US Highway 68; Downstream of LTRWC	36°50'12.99"N	86°47'36.35"W	Turbo (4")	N	Y	AC (Utilize Existing @ Pump)
19	Dennis Road Master Meter **(ALT)**	Dennis Road; 1/2 mile S. Duncan Chap.	36°51'8.74"N	86°47'38.97"W	Turbo (4")	N	Y	Solar (New)

EXISTING LOGAN TODD - ELWD METERING POINTS				
Map ID	METER NAME	LOCATION BY ROADWAY	LATITUDE	LONGITUDE
13	LTRWC: Dennis Pump Station	US Highway 68	36°50'12.99"N	86°47'36.35"W
14	LTRWC: Shaker town Master Met.	US Highway 68E @ Auburn	36°52'16.16"N	86°41'15.45"W
15	LTRWC: KY 79 Master Meter	KY 79 (Morgantown Road) @ Bypass	36°51'59.02"N	86°52'3.67"W
16	LTRWC: Cemetery Road PS	US Highway 68 @ KY 722	36°51'20.80"N	86°45'11.95"W

OTHER POINTS OF REFERENCE				
Map ID	METER NAME	LOCATION BY ROADWAY	LATITUDE	LONGITUDE
17	Water District Office	333 S. Franklin Street; Russellville, KY	36°50'42.39"N	86°52'29.52"W
18	LTRWC: Russellville Tank Site	C. Dodson Lane; Russellville, KY	36°50'3.24"N	86°51'20.79"W

GENERAL NOTES:

1. PIPE SHALL BE CLASS 350 DUCTILE IRON PIPE WITH RESTRAINED FITTINGS.
2. GATE VALVES SHALL CONFORM TO AWWA C509 AND SHALL HAVE MECHANICAL OR PUSH–ON JOINT ENDS. VALVES SHALL BE RATED FOR 200 PSI WORKING PRESSURE.
3. FITTINGS SHALL BE DUCTILE IRON CONFORMING TO AWWA C110. CONCRETE FOR THRUST BLOCKING SHALL HAVE A 28–DAY COMPRESSIVE STRENGTH OF 2,500 PSI.
4. DETECTOR WIRE SHALL BE 12 GAUGE SOLID COPPER INSULATED WIRE. ATTACH WIRE TO THE TOP OF THE PIPE WITH DUCT TAPE.
5. THE INSTALLED LINE SHALL BE FLUSHED THOROUGHLY, FILLED WITH WATER AND PRESSURIZED TO 200 PSIG FOR 4 HOURS. ANY LEAKAGE OBSERVED SHALL BE REPAIRED AND THE TEST REPEATED UNTIL THE ENGINEER DETERMINES THAT THE LINE IS ACCEPTABLE.
6. PRIOR TO BEING PLACED IN SERVICE, THE LINE SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C651. THE CONTRACTOR SHALL PERFORM BACTERIOLOGICAL TESTING OF THE DISINFECTED LINE AND DELIVER TEST RESULTS INDICATING ACCEPTABLE DISINFECTION TO THE WATER UTILITY.
7. THE CONTRACTOR SHALL KEEP THE WORK AREA CLEAN AND ORDERLY AT ALL TIMES. ALL TRASH AND DEBRIS SHALL BE PICKED UP AND REMOVED FROM THE JOB SITE AT THE END OF EACH DAY.
8. CONTRACTOR SHALL COORDINATE WORK ON PRIVATE PROPERTY WITH THE PROPERTY OWNER, DISTURBANCE OF EXISTING FENCES SHALL BE HELD TO A MINIMUM, AND ANY FENCE DAMAGED BY CONSTRUCTION SHALL BE REPLACED IN KIND AT THE CONTRACTOR'S EXPENSE.
9. CONTRACTOR SHALL CONTACT KY. UNDERGROUND PROTECTION, INC. AT (811), AS WELL AS OTHER UTILITIES, PIPELINE COMPANIES, ETC. POTENTIALLY HAVING UNDERGROUND LINES, UTILITIES, STRUCTURES, ETC. IN THE AREA FOR VERIFICATION AND LOCATION PRIOR TO EXCAVATION.
10. THE WATER UTILITY SHALL BE RESPONSIBLE FOR OBTAINING AND RECORDING NEW EASEMENTS PRIOR TO CONSTRUCTION ON ANY PRIVATE PROPERTIES. CONTRACTOR SHALL VERIFY EASEMENTS AND RIGHT OF ENTRY BEFORE BEGINNING CONSTRUCTION.
11. DISCONNECT AND REMOVE EXISTING TELEMETRY PANELS, DEVICES, AND OTHER MATERIALS WHICH ARE NOT INCORPORATED INTO OR UTILIZED WITHIN THE UPGRADED SCADA SYSTEM. ONCE THE NEW SYSTEM IS OPERATIONAL, REMOVE ALL ASSOCIATED CONDUIT AND WIRING, INCLUDING BUT NOT LIMITED TO, CONDUIT AND WIRING BETWEEN PANELS AND VAULTS PLUS REPLACED ANTENNAS.
12. CONTRACTOR TO FIELD VERIFY EXISTING PIPING LAYOUT AND SIZES PRIOR TO CONSTRUCTION.
13. ALL DISTURBED AREAS CREATED BY REMOVAL OF EQUIPMENT OR INSTALLATION OF NEW EQUIPMENT SHALL BE PATCHED OR GRADED & SEEDED TO MATCH CONDITIONS PRIOR TO CONSTRUCTION.

UTILITY CONTACTS

Ky. Underground Protection	811
AT&T (South Central Bell)	(800) 945–6500
Pennyrile Rural Electric Coop.	(800) 726–2479
Russellville Electric Plant Board	(270) 726–2466
Warren Rural Electric	(800) 844–1664
Texas Gas Pipeline	(800) 626–1948
Atmos (Western Kentucky Gas)	(270) 843–3393
KYTC District #3: Bowling Green	(270) 746–7898
Logan County Road Department	(270) 726–7480
Russellville Water & Sewer	(270) 726–5025

LEGEND

PROPOSED WATER PIPING	————
EXISTING EAST LOGAN WATER	— — — — —
EXISTING LOGAN TODD WATER	—LT—LT—LT—LT—
PROPERTY LINE	——— — — ———
BURIED ELECTRIC SERVICE	—E—E—E—E—
EXISTING GAS MAIN	— GAS — GAS —
RESIDENTIAL METER	M
PHONE PEDESTAL	T
POWER/TELEPHONE POLE OR LIGHT POLE	• P/T • LP
GUY WIRE	⌀
VALVE	⊗
FLUSH HYDRANT	⊗FH
BURIED BLOWOFF	B

ENVIRONMENTAL NOTE:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING, REMOVING AND DISPOSING OF TREES, BRUSH, STUMPS, ROOTS, AND WEEDS WITHIN THE CONSTRUCTION AREA AS REQUIRED FOR CONSTRUCTION OF THE FEATURES. AVOID CUTTING OF, OR DAMAGE TO MATURE TREES (DBH>5"), AND TREES NOT IN THE CONSTRUCTION AREA. MATURE TREES MAY ONLY BE REMOVED DURING THE PERIOD BETWEEN OCTOBER 15TH AND MARCH 31ST. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REPLACEMENT OF TREES, SHRUBS, ETC. UNNECESSARILY DAMAGED OR REMOVED.

BASEMAP & SCALE NOTE:

THE LOCATIONS OF EXISTING TOPOGRAPHIC FEATURES AND UTILITIES ARE APPROXIMATE. THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE PROJECT SITE PRIOR TO CONSTRUCTION. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR ASSUME THAT ALL FEATURES ARE IDENTIFIED AND INDICATED IN THEIR EXACT LOCATION. THE CONTRACTOR SHALL CONTACT 'KENTUCKY UNDERGROUND PROTECTION, INC.', AS WELL AS OTHER UTILITIES, PIPELINE COMPANIES, ETC. POTENTIALLY HAVING UNDERGROUND LINES, UTILITIES, STRUCTURES, ETC.. IN THE AREA FOR VERIFICATION AND LOCATION PRIOR TO EXCAVATION.

No	Revision	Date	By
2			
1	FOR CONSTRUCTION	06–01–18	CWW
0	FOR KDOW REVIEW	02–14–18	CWW

REVISIONS

EAST LOGAN WATER DISTRICT
333 South Franklin Street
Russellville, KY 42276
(270) 717-0991

McGHEE ENGINEERING
202 Ewing Street
Guthrie, KY 42234
(270) 483-9985

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:

LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS

Site Locations & General Information

Quality On Tap!

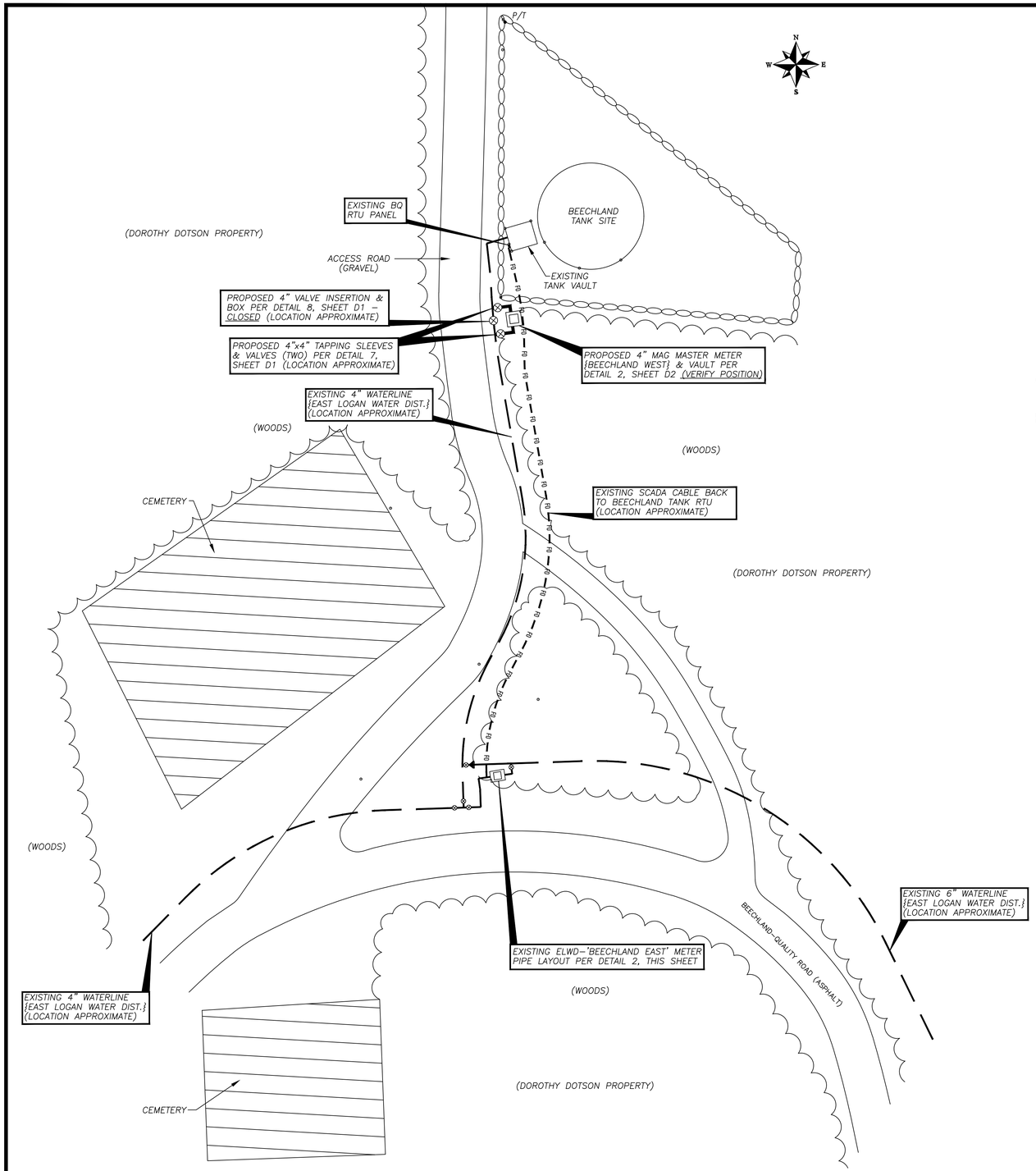
February 14, 2018

STATE OF KENTUCKY CHRIS WILCUTT 21523 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

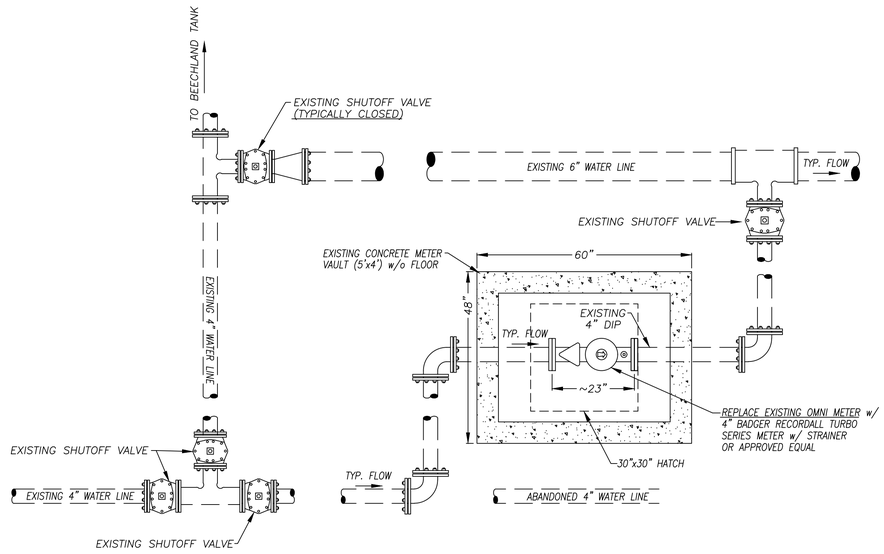
DRAWING NO.

SHEET T-2



SITE #1
ELWD – BEECHLAND TANK AREA — 1 / P1

SCALE: 1"=20'



SITE #1
ELWD – BEECHLAND EAST VAULT LAYOUT — 2 / P1

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (ELWD -BEECHLAND WEST MASTER METER {NEW}):

1. CONTRACTOR TO PAIR NEW MASTER METER WITH NEW RTU PANEL INSTALLED AT BEECHLAND TANK BY PROVIDING ALL NECESSARY COAXIAL CABLE (4 TWISTED PAIR CABLE; 18 AWG), CONDUIT, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT.
2. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO CONNECT WITH RTU AS REQUIRED.
3. PROVIDE (1 EA.) AND INSTALL NEW PREFABRICATED CONCRETE MASTER METER VAULT AS SPECIFIED IN THE CONTRACT DOCUMENTS.
4. PROVIDE (1 EA.) NEW 4–INCH ELECTROMAGNETIC FLOW METER (ABB WATERMASTER MAGNETIC FLOW METER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED FLOW HEAD WITH REMOTE MOUNT DIGITAL DISPLAY WITH INTERNAL POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
   c. REMOTE FLOW TRANSMITTER TO BE HOUSED IN A SECONDARY NEMA 4 SS ENCLOSURE OR MOUNTED IN THE NEW RTU ENCLOSURE.
5. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED

SCOPE OF WORK NOTES (ELWD - BEECHLAND EAST MASTER METER VAULT):

1. CONTRACTOR TO PAIR REPLACED MASTER METER WITH NEW RTU PANEL LOCATED AT BEECHLAND TANK. EXISTING CONDUCTOR CABLE FROM THE 'BEECHLAND EAST' METER VAULT TO THE TANK LOCATION IS TO BE RE–USED. THE CABLE IS ASSUMED TO BE IN GOOD WORKING ORDER WITH SUFFICIENT CONDUCTOR COUNT. IF NEW CABLING IS REQUIRED, THE SUPPLEMENTAL BID ITEM FOR SUCH WILL BE UTILIZED. A NEW CABLE WOULD BE INSTALLED IN A 1.5" DIAMETER (MIN.) CONDUIT, AND THE CABLE WOULD BE AS FOLLOWS: INSTRUMENTATION CABLE, TYPE PLTC , TYPE ITC, 300V, 8 TWISTED PAIRS, 18 AWG, PVC CONDUCTOR INSULATION MATERIAL, BLACK AND WHITE NUMBERED PAIRS, OVERALL SHIELDED, PVC JACKET.
2. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
3. PROVIDE (1 EA.) NEW 4–INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
4. PROVIDE DRESSER COUPLINGS & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUN.
5. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

SCOPE OF WORK NOTES (ELWD - BEECHLAND TANK):

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU" TO REPLACE EXISTING RTU AT TANK SITE.
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE (1 EA.) NEW TANK LEVEL PRESSURE TRANSDUCER WITH INTEGRAL DIGITAL DISPLAY. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR.
4. PROVIDE AND INSTALL (1 EA) NEW TANK LEVEL PRESSURE GAUGE WITH FEET OF WATER ENGINEERING UNITS, 4 INCH DIAL, ½ % ACCURACY. ALL RELATED CONNECTING PIPE FITTINGS TO BE BRASS OR STAINLESS STEEL.
5. PROVIDE NEW ANTENNA (UTILIZING EXISTING POLE MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED.
6. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
7. UTILIZE EXISTING 120 VAC ELECTRICAL SERVICE. REPAIR OR REPLACE ANY EXISTING CONDUIT OR WIRING AS NEEDED TO ASSURE THERE ARE NO EXPOSED WIRING OR OPEN CONDUIT JOINTS FROM THE POWER PANEL TO THE RTU ENCLOSURE.
8. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE NEW RTU AS REQUIRED.
9. EXISTING CONDUCTOR CABLE FROM THE 'BEECHLAND EAST' METER VAULT TO THE TANK LOCATION IS TO BE RE–USED. THE CABLE IS ASSUMED TO BE IN GOOD WORKING ORDER WITH SUFFICIENT CONDUCTOR COUNT. IF NEW CABLING IS REQUIRED, THE SUPPLEMENTAL BID ITEM FOR SUCH WILL BE UTILIZED. A NEW CABLE WOULD BE INSTALLED IN A 1.5" DIAMETER (MIN.) CONDUIT, AND THE CABLE WOULD BE AS FOLLOWS: INSTRUMENTATION CABLE, TYPE PLTC , TYPE ITC, 300V, 8 TWISTED PAIRS, 18 AWG, PVC CONDUCTOR INSULATION MATERIAL, BLACK AND WHITE NUMBERED PAIRS, OVERALL SHIELDED, PVC JACKET.
10. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
11. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR TANK LEVEL MEASUREMENT, FLOW RATE, FLOW TOTALIZATION, TANK FILL VALVE CONTROL, POWER STATUS.
12. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

REVISIONS

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LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
Beechland East & West Master Meters
Site Plan & Details

Quality On Tap!

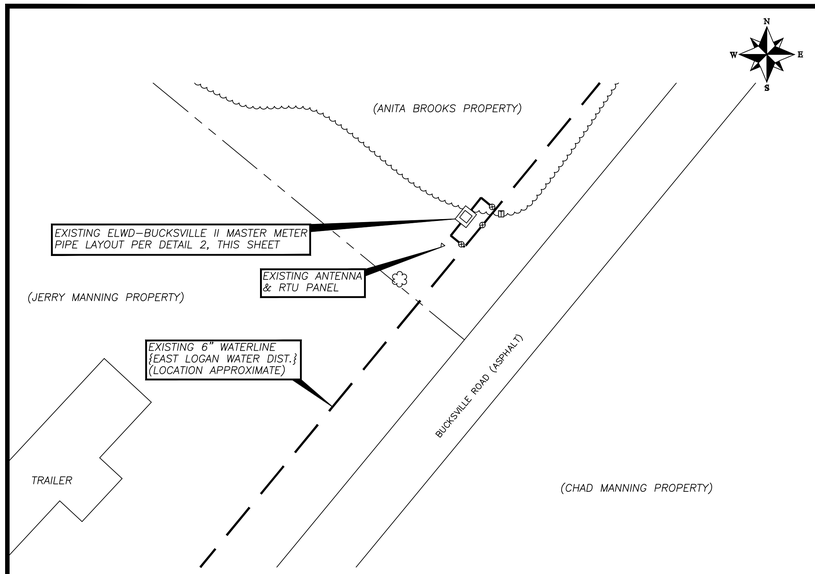
February 14, 2018

STATE OF KENTUCKY — CHRIS WILCUTT 21523 — LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

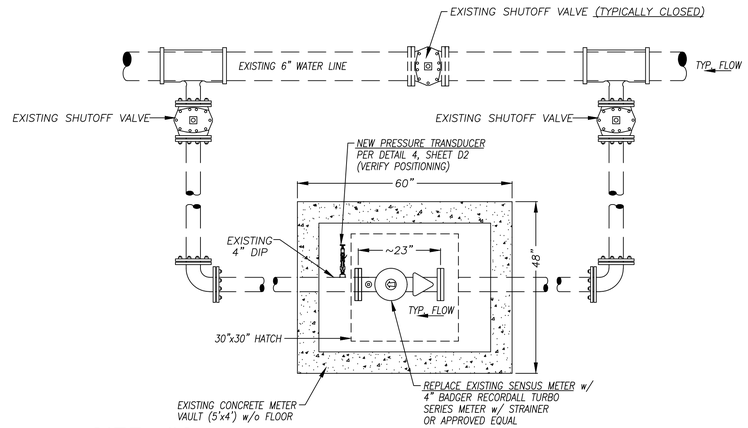
DRAWING NO.

SHEET P-1



SITE #2
ELWD – BUCKSVILLE II MASTER METER — 1 / P2

SCALE: 1"=20'



SITE #2
ELWD – BUCKSVILLE II VAULT LAYOUT — 2 / P2

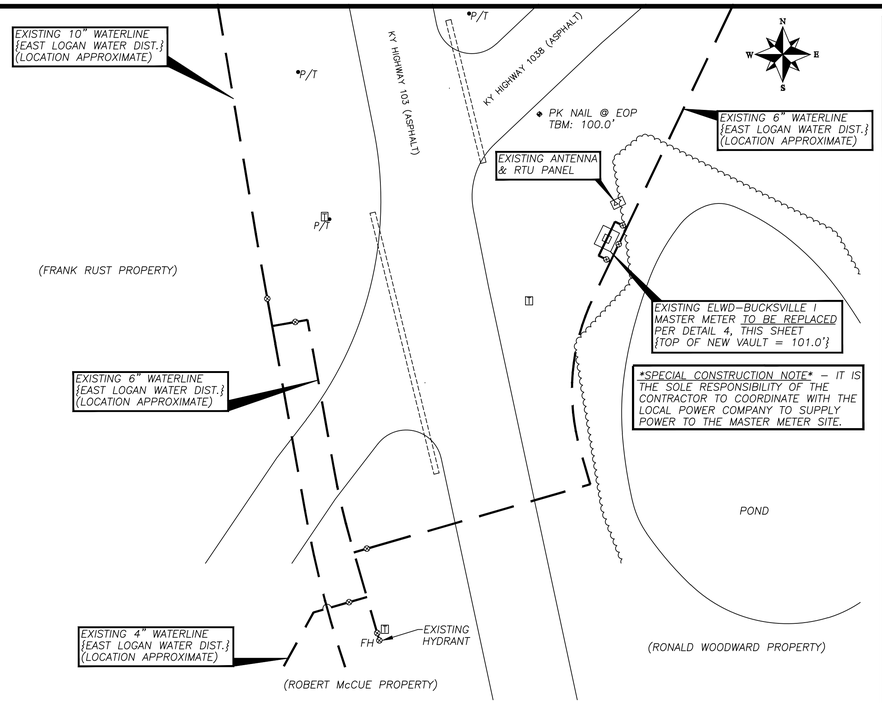
SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (BUCKSVILLE II SITE):

1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. UTILIZE EXISTING SOLAR POWER UNIT ENCLOSURE. REPLACE EXISTING SOLAR POWER BATTERY WITH SIMILAR TYPE AND SIZE. REPLACE EXISTING SOLAR POWER CONTROLLER WITH DIGITAL DISPLAY TYPE CONTROLLER
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE ONE NEW SYSTEM PRESSURE TRANSDUCER IN EXISTING VAULT "SUBMERSIBLE RATED".
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
4. PROVIDE NEW ANTENNA (INSTALLED ON EXISTING TOWER MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
5. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE RTU AS REQUIRED.
6. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
7. PROVIDE NEW 4–INCH TURBO FLOW METER (1 EA.) IN EXISTING VAULT (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL). INSTALL NEW FLOW METER IN EXISTING VAULT. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
8. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
9. PROVIDE DRESSER COUPLING & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUNS.
10. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.



SITE #4 [BASE BID METHOD]
ELWD – BUCKSVILLE I MASTER METER — 3 / P2

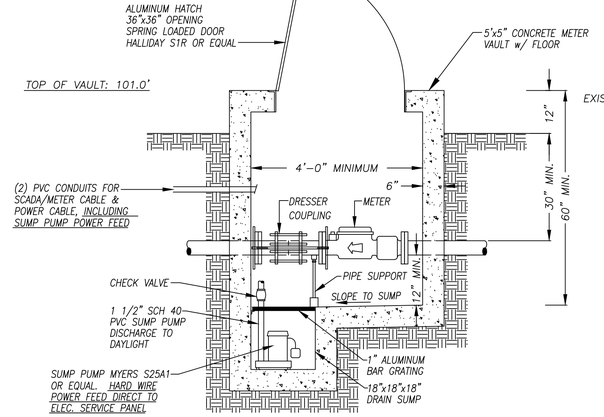
SCALE: 1"=20'

GENERAL NOTES:

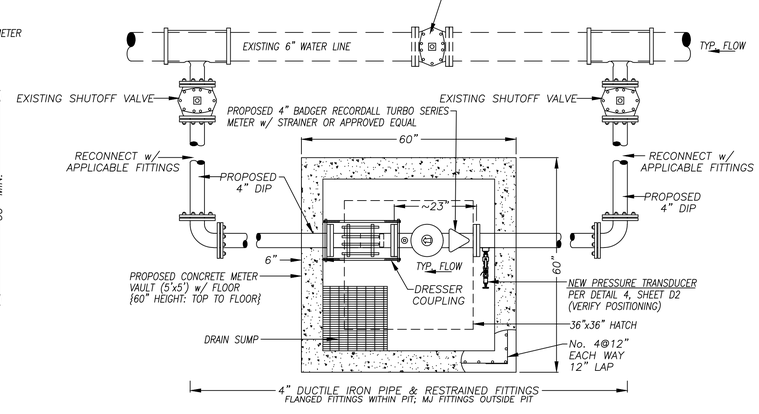
1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (BUCKSVILLE I SITE):

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE AND INSTALL (1 EA) NEW FREE–STANDING ALUMINUM RADIO COMMUNICATIONS TOWER WITH A HEIGHT AS REQUIRED BY RADIO PATH STUDY RESULTS. (MINIMUM TOWER HEIGHT SHALL BE 20 FEET). TO INCLUDE RADIO COMMUNICATIONS ANTENNA, COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT. (NOTE: IF RADIO PATH FADE MARGINS REQUIREMENTS CAN BE MET, THE ANTENNA/MAST MAY BE MOUNTED ON THE RTU MOUNTING STRUCTURE. THE ANTENNA MAST MUST BE SECURELY MOUNTED WITH 3 POINTS OF CONTACT. ANTENNA TO BE A MINIMUM OF 10 FEET FROM GROUND LEVEL.)
4. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE RTU AS REQUIRED.
5. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY NEW OR EXISTING CABLING THAT IS OPEN OR EXPOSED.
6. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
7. REMOVE EXISTING METER VAULT AND PROVIDE AND INSTALL (1 EA.) NEW PREFABRICATED CONCRETE MASTER METER VAULT AS ILLUSTRATED IN DETAIL 4, THIS SHEET. NEW VAULT SHALL BE EQUIPPED WITH SUMP PUMP (MYERS S25A1 OR EQUAL) PLUS 1–1/2" DISCHARGE PIPING, INCLUDING CHECK VALVE.
8. HARD WIRE SUMP PUMP POWER FEED WITHIN NEW PVC CONDUIT (SIZE PER NEC CODE) INSTALLED DIRECT TO NEW ELECTRICAL SERVICE PANEL. PLACE FEED ON SEPARATE, DEDICATED CIRCUIT BREAKER FOR MANUAL PUMP OPERATION BY USER.
9. INSTALL (1 EA) NEW 100 AMP 240/120 VAC ELECTRICAL SERVICE WITH ONE MAIN BREAKER AND A MINIMUM OF 4 EACH 15AMP SINGLE POLE BREAKERS.
   a. THE OWNER SHALL PROVIDE FOR ALL COORDINATION AND FEES WITH THE UTILITY COMPANY TO HAVE POWER INSTALLED TO THE SITE LOCATION.
   b. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING THE SERVICE PANEL, RELATED INSPECTION FEES AND CONDUIT/WIRING TO THE RTU AS REQUIRED.
10. PROVIDE NEW 4–INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
    a. INSTALL NEW FLOW METER IN VAULT. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA.
    b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
11. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, HIGH WATER ALARM VIA HIGH LEVEL FLOAT SWITCH, POWER STATUS, ETC.
12. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
13. TOP OF VAULT ELEVATION = 101.0' (RELATIVE TO TBM PK LISTED). GRADE TO DRAIN.



ELEVATION VIEW



PLAN VIEW

INSTALLATION NOTES:

1. THE SCADA CONDUIT SHALL BE RIGID PVC WITH SWEEPING BENDS. IT SHALL BE INSTALLED WITH A MINIMUM DEPTH OF 30" WITH A MINIMUM OF 12" FLOWABLE CONCRETE FILL ABOVE. ALSO, AN ELECTRICAL WARNING TAPE SHALL BE INSTALLED IN THE TRENCH, APPROXIMATELY 12" DEEP.
2. EXTERIOR VAULT SURFACES AROUND PIPE PENETRATIONS SHALL BE SEALED THOROUGHLY TO PREVENT OR LIMIT INFLOW OF GROUND WATER INTO THE VAULT.
3. NEW VAULT NOTE: ALL CONCRETE SURFACES & PIPING (EXCL. METER) INSIDE THE VALVE VAULT ARE TO RECEIVE A SURFACE PREPARATION AND COATING SYSTEM EQUAL TO THE FOLLOWING TNEMEC SYSTEMS:

CONCRETE FLOOR	SYSTEM 67–1	GRAY (IN05)
OTHER CONCRETE	SYSTEM 66–4	WHITE (WH01)
PIPING, VALVES	SYSTEM 66–2	BLUE (GB03)

SITE #4 [BASE BID METHOD]
ELWD – BUCKSVILLE I VAULT LAYOUT — 4 / P2

SCALE: NONE

No	Revision	Date	By
1	MODIFIED SITE 4	10–24–18	CWW
2	FOR CONSTRUCTION	05–01–18	CWW
3	FOR KDOW REVIEW	02–14–18	CWW

REVISIONS

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EAST LOGAN WATER DISTRICT
333 South Franklin Street
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DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
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LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
Bucksville I & Bucksville II Master Meters
Site Plans & Details

Quality On Tap!

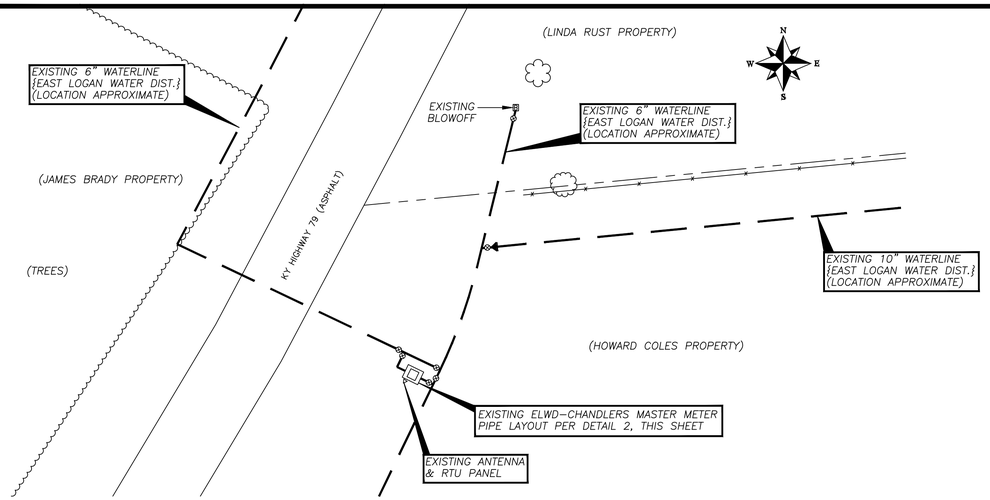
February 14, 2018

STATE OF KENTUCKY — CHRIS WILCUTT 21623 — LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

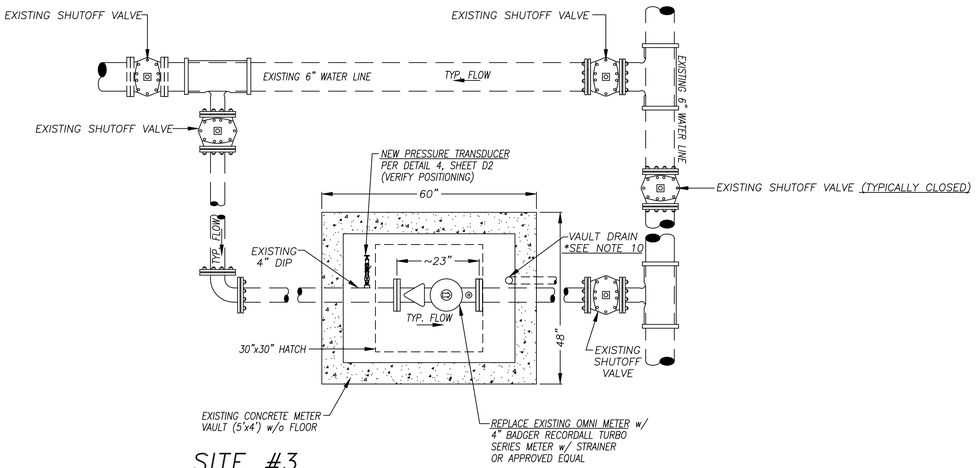
SHEET P-2



SITE #3
ELWD – CHANDLERS MASTER METER

1 / P3

SCALE: 1"=20'



SITE #3
ELWD – CHANDLERS VAULT LAYOUT

2 / P3

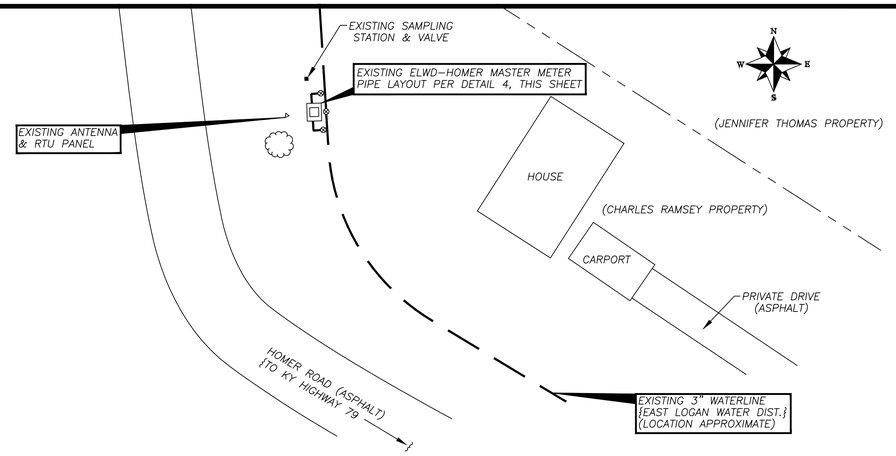
SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (CHANDLERS METER SITE):

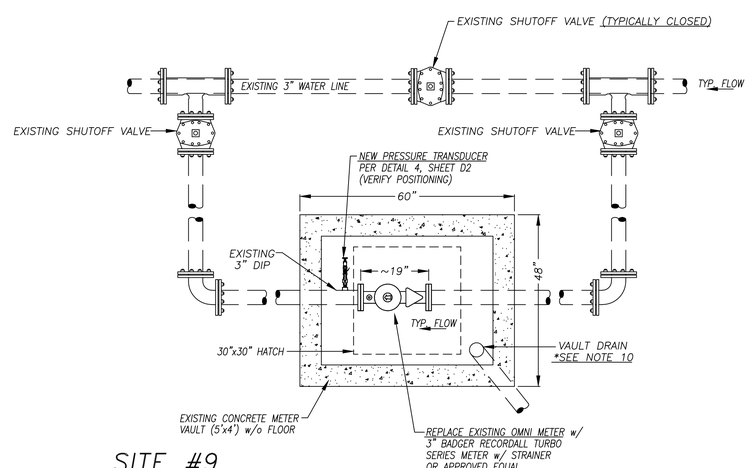
1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. UTILIZE EXISTING SOLAR POWER UNIT ENCLOSURE. REPLACE EXISTING SOLAR POWER BATTERY WITH SIMILAR TYPE AND SIZE. REPLACE EXISTING SOLAR POWER CONTROLLER WITH DIGITAL DISPLAY TYPE CONTROLLER.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE ONE NEW SYSTEM PRESSURE TRANSDUCER IN EXISTING VAULT "SUBMERSIBLE RATED".
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
4. PROVIDE NEW ANTENNA (INSTALLED ON EXISTING TOWER MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
5. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE RTU AS REQUIRED.
6. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
7. PROVIDE NEW 4–INCH TURBO FLOW METER (1 EA.) IN EXISTING VAULT (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL). INSTALL NEW FLOW METER IN EXISTING VAULT. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
8. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
9. PROVIDE DRESSER COUPLING & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUNS.
10. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
11. CONTRACTOR SHALL CLEAN OUT AND/OR SPOT REPAIR EXISTING DRAIN PIPE TO DITCH OR DAYLIGHT TO INSURE PROPER VAULT DRAINAGE.



SITE #9
ELWD – HOMER MASTER METER

3 / P3

SCALE: 1"=20'



SITE #9
ELWD – HOMER VAULT LAYOUT

4 / P3

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (HOMER METER SITE):

1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. UTILIZE EXISTING SOLAR POWER UNIT ENCLOSURE. REPLACE EXISTING SOLAR POWER BATTERY WITH SIMILAR TYPE AND SIZE. REPLACE EXISTING SOLAR POWER CONTROLLER WITH DIGITAL DISPLAY TYPE CONTROLLER.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE ONE NEW SYSTEM PRESSURE TRANSDUCER IN EXISTING VAULT "SUBMERSIBLE RATED".
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
4. PROVIDE NEW ANTENNA (INSTALLED ON EXISTING TOWER MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
5. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE RTU AS REQUIRED.
6. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
7. PROVIDE NEW 3–INCH TURBO FLOW METER (1 EA.) IN EXISTING VAULT (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL). INSTALL NEW FLOW METER IN EXISTING VAULT. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
8. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
9. PROVIDE DRESSER COUPLING & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUNS.
10. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
11. CONTRACTOR SHALL CLEAN OUT AND/OR SPOT REPAIR EXISTING DRAIN PIPE TO DITCH OR DAYLIGHT TO INSURE PROPER VAULT DRAINAGE.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

REVISIONS

EAST LOGAN WATER DISTRICT
333 South Franklin Street
Russellville, KY 42276
(270) 717-0991

McGHEE ENGINEERING
202 Ewing Street
Guthrie, KY 42234
(270) 483-9985

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
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PROJECT DATE: 2018
PRINTED:
LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
Chandlers (S. Flow) & Homer Master Meters
Site Plans & Details

Quality On Tap!

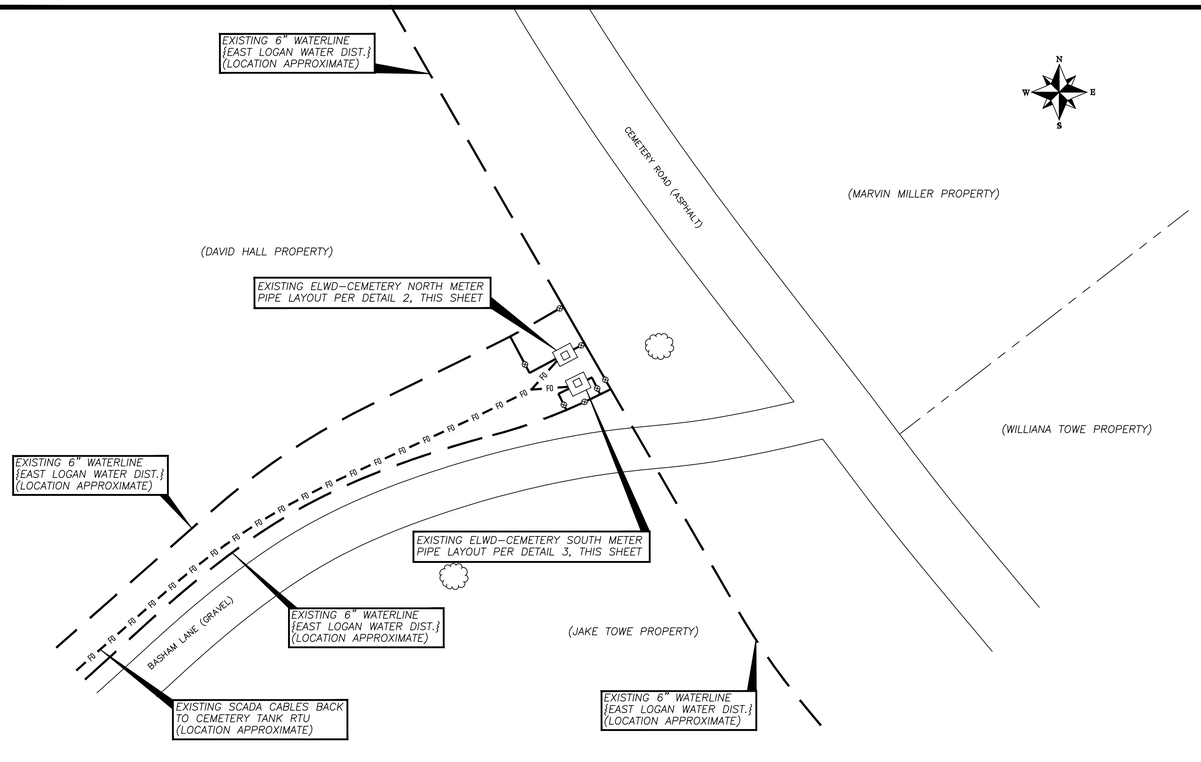
February 14, 2018

COMMONWEALTH OF KENTUCKY CHRIS WILCUTT 21523 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

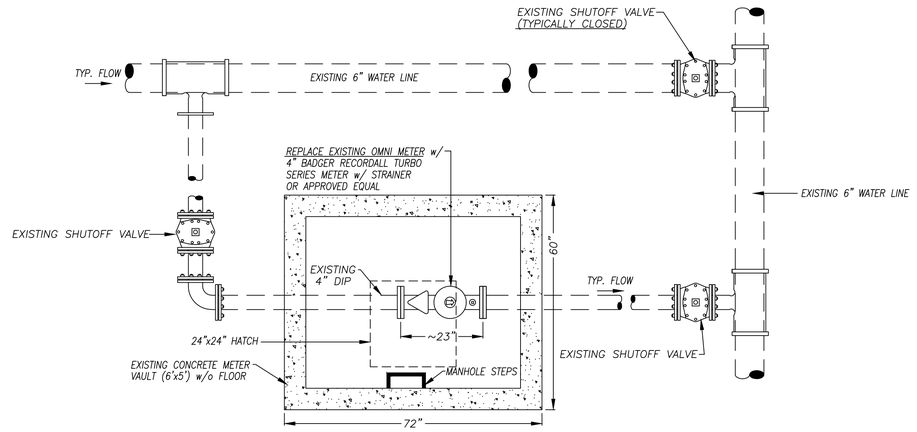
SHEET P-3



SITE #5
ELWD – CEMETERY TANK AREA

1 / P4

SCALE: 1"=20'



SITE #5
ELWD – CEMETERY NORTH VAULT LAYOUT

2 / P4

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.
3. EXISTING MULTI–CONDUCTOR CABLE FROM THE CEMETERY ROAD METER VAULTS (2) TO THE TANK LOCATION (NOT SHOWN) ARE TO BE RE–USED IF THERE ARE ADEQUATE NUMBER OF CONDUCTORS. THE CABLE IS ASSUMED TO BE IN GOOD WORKING ORDER WITH SUFFICIENT CONDUCTOR COUNT. IF NEW CABLING IS REQUIRED, THE SUPPLEMENTAL BID ITEM FOR SUCH WILL BE UTILIZED. A NEW CABLE WOULD BE INSTALLED IN A 1.5" DIAMETER (MIN.) CONDUIT, AND THE CABLE WOULD BE AS FOLLOWS: INSTRUMENTATION CABLE, TYPE PLTC , TYPE ITC, 300V, 8 TWISTED PAIRS, 16 AWG, PVC CONDUCTOR INSULATION MATERIAL, BLACK AND WHITE NUMBERED PAIRS, OVERALL SHIELDED, PVC JACKET.

SCOPE OF WORK NOTES (ELWD - CEMETERY SOUTH VAULT):

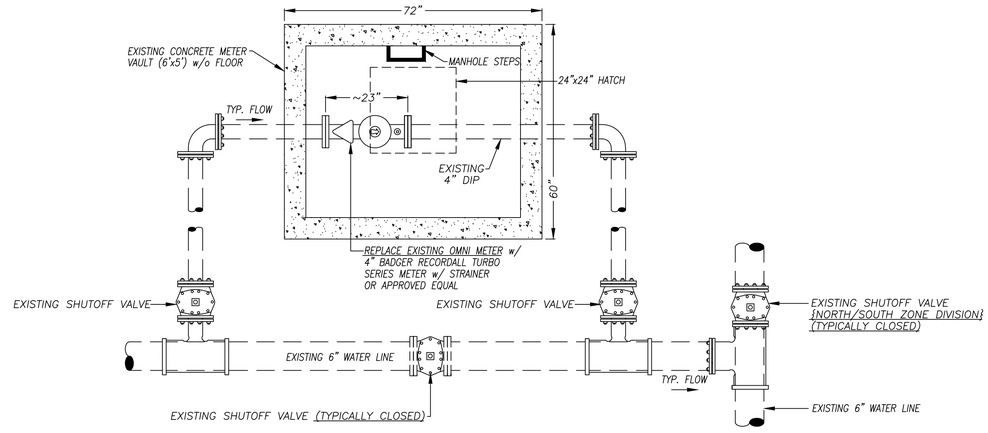
1. CONTRACTOR TO PAIR MASTER METER WITH RTU PANEL LOCATED AT CEMETERY TANK (NOT SHOWN).
2. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
3. PROVIDE (1 EA.) NEW 4–INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
4. PROVIDE DRESSER COUPLINGS & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUN.
5. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

SCOPE OF WORK NOTES (ELWD - CEMETERY NORTH VAULT):

1. CONTRACTOR TO PAIR MASTER METER WITH RTU PANEL LOCATED AT CEMETERY TANK (NOT SHOWN).
2. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
3. PROVIDE (1 EA.) NEW 4–INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
4. PROVIDE DRESSER COUPLINGS & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUN.
5. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

SCOPE OF WORK NOTES (ELWD - CEMETERY TANK (NOT SHOWN)):

1. SEE DETAILED SCOPE OF WORK FOR TANK SITE AREA ON PLAN SHEET P–13 (DETAIL 1).



SITE #5
ELWD – CEMETERY SOUTH VAULT LAYOUT

3 / P4

SCALE: NONE

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East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
Cemetery North & South Master Meters
Site Plan & Details

Quality On Tap!

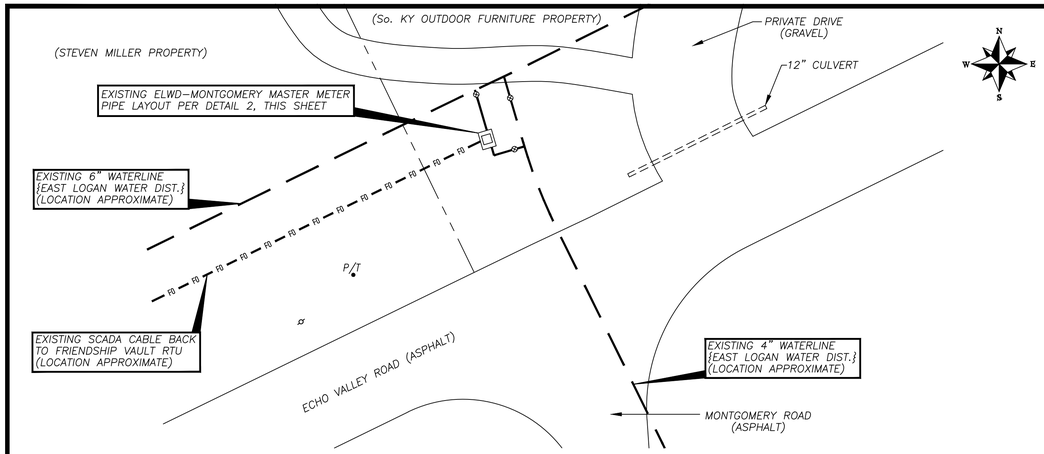
February 14, 2018

COMMONWEALTH OF KENTUCKY CHRIS WILCUTT 21523 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

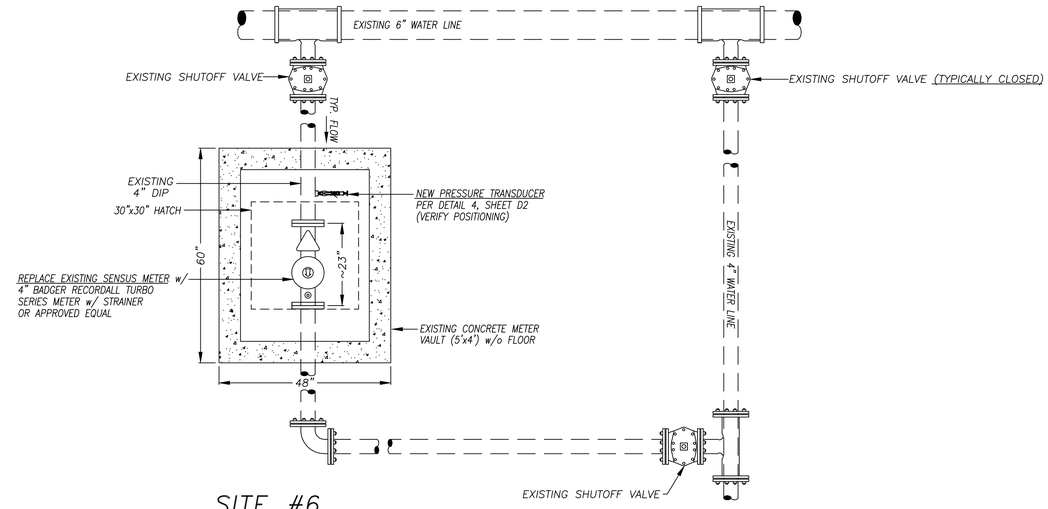
SHEET P-4



SITE #6
ELWD – MONTGOMERY MASTER METER

1 / P5

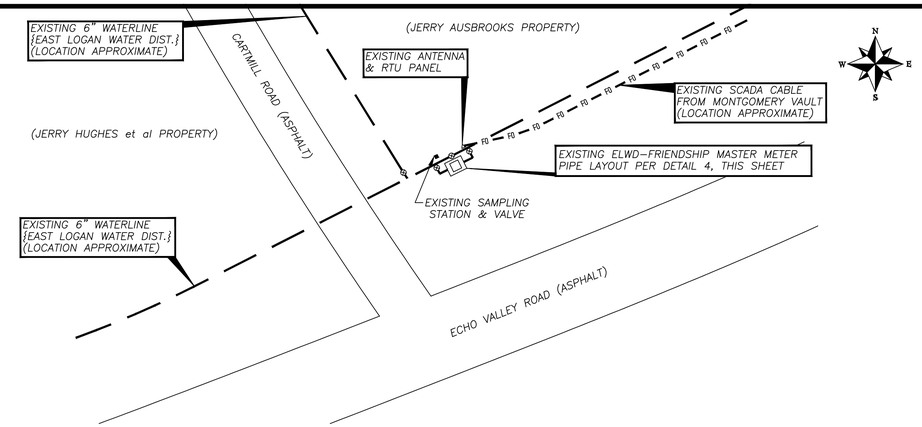
SCALE: 1"=20'



SITE #6
ELWD – MONTGOMERY VAULT LAYOUT

2 / P5

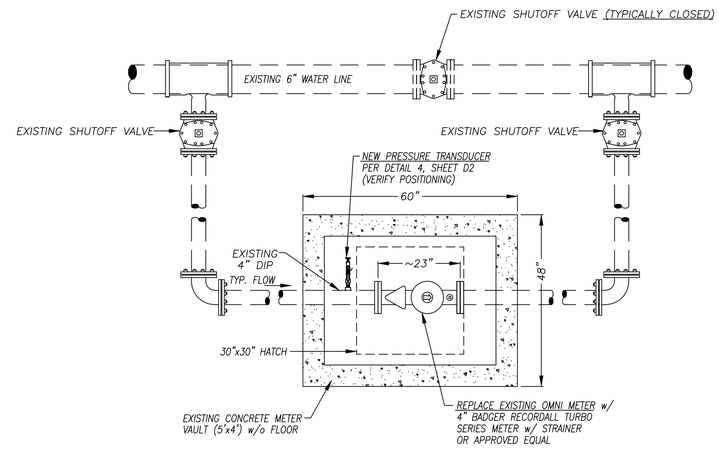
SCALE: NONE



SITE #7
ELWD – FRIENDSHIP MASTER METER

3 / P5

SCALE: 1"=20'



SITE #7
ELWD – FRIENDSHIP VAULT LAYOUT

4 / P5

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.
3. EXISTING MULTI–CONDUCTOR CABLE BETWEEN THE METER VAULTS (2) (PARTIALLY SHOWN) IS TO BE RE–USED IF THERE ARE ADEQUATE NUMBER OF CONDUCTORS. THE CABLE IS ASSUMED TO BE IN GOOD WORKING ORDER WITH SUFFICIENT CONDUCTOR COUNT. IF NEW CABLING IS REQUIRED, A SUPPLEMENTAL BID ITEM FOR SUCH WILL BE UTILIZED.

SCOPE OF WORK NOTES (FRIENDSHIP & MONTGOMERY):

1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU" NEAR THE 'FRIENDSHIP VAULT'.
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. UTILIZE EXISTING SOLAR POWER UNIT ENCLOSURE. REPLACE EXISTING SOLAR POWER BATTERY WITH SIMILAR TYPE AND SIZE. REPLACE EXISTING SOLAR POWER CONTROLLER WITH DIGITAL DISPLAY TYPE CONTROLLER.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE ONE NEW SYSTEM PRESSURE TRANSDUCER AT EACH VAULT "SUBMERSIBLE RATED" {TWO TOTAL}.
   a. PRESSURE TRANSDUCERS SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLES AND ISOLATION VALVES AS NEEDED FOR PRESSURE MEASURING POINTS.
4. PROVIDE NEW ANTENNA (INSTALLED ON EXISTING TOWER MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
5. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE RTU AS REQUIRED.
6. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
7. PROVIDE NEW 4–INCH TURBO FLOW METER IN EACH VAULT {TWO TOTAL} (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. INSTALL NEW FLOW METER IN EACH VAULT. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA.
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
8. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
9. PROVIDE DRESSER COUPLING & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUNS.
10. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

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DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:
LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
Friendship & Montgomery Master Meters
Site Plans & Details

Quality On Tap!

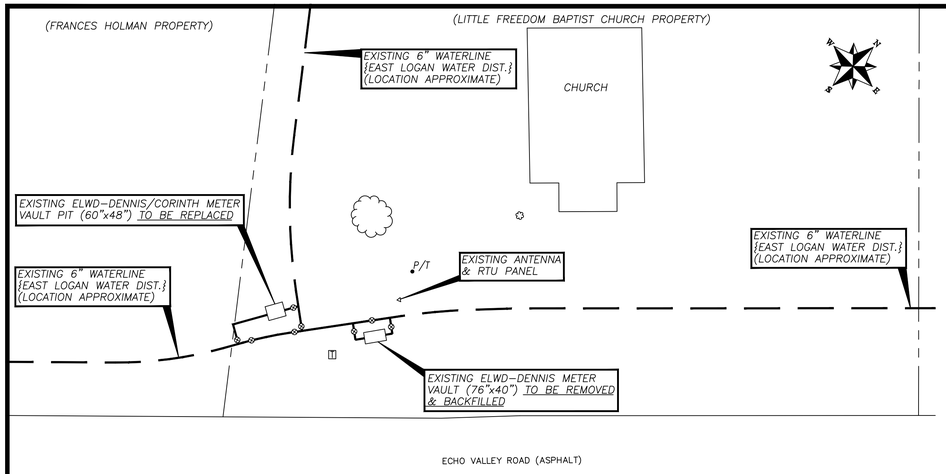
February 14, 2018

STATE OF KENTUCKY — CHRIS WILCUTT 21523 — LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

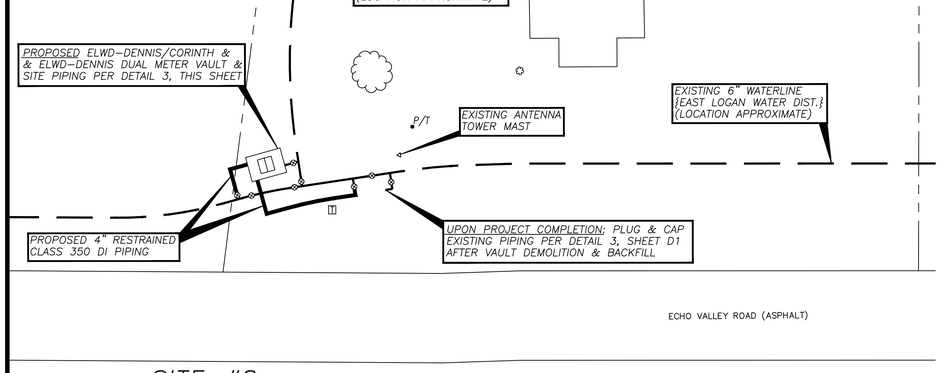
SHEET P-5



SITE #8
ELWD – DENNIS & DENNIS/CORINTH AREA {EXISTING}

1 / P6

SCALE: 1"=20'



SITE #8
ELWD – DENNIS & DENNIS/CORINTH AREA {PROPOSED}

2 / P6

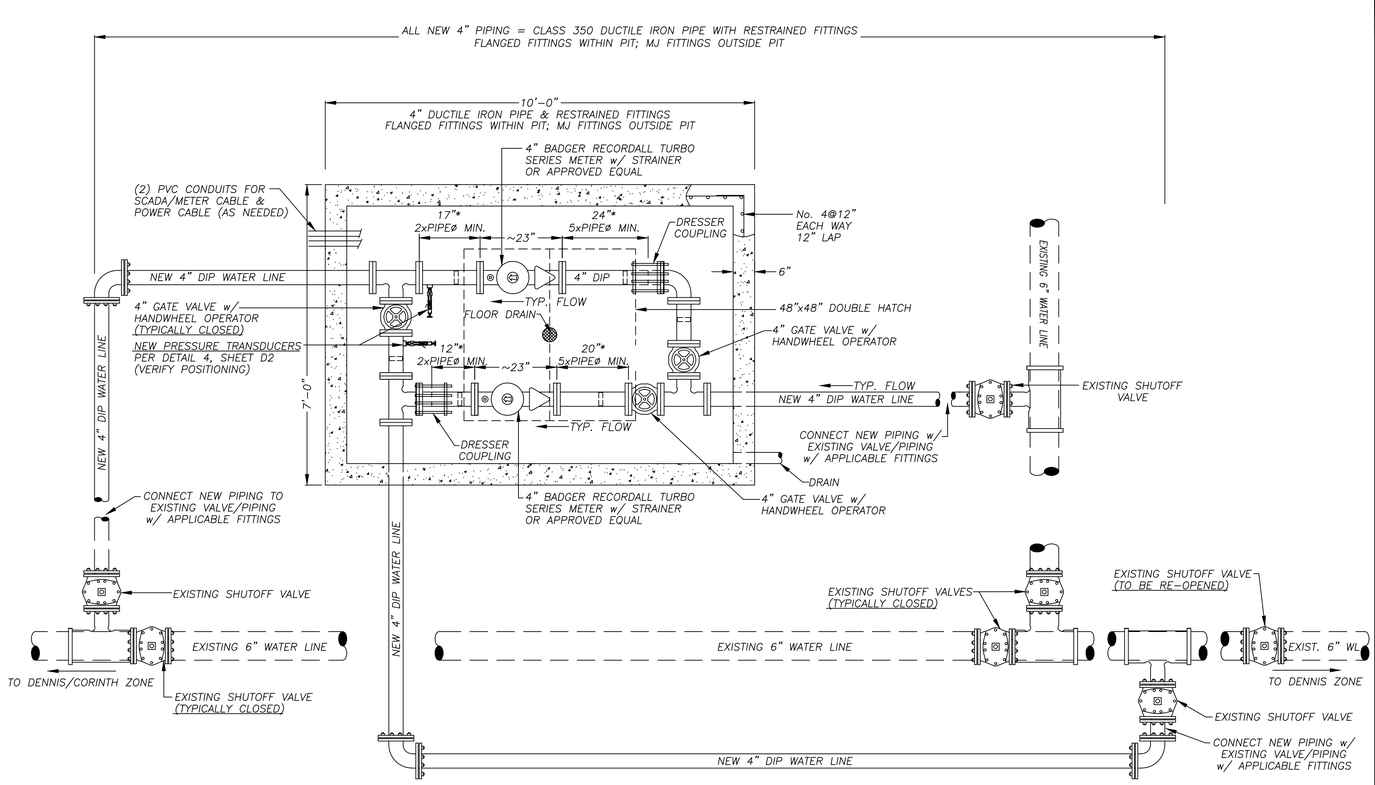
SCALE: 1"=20'

GENERAL NOTES:

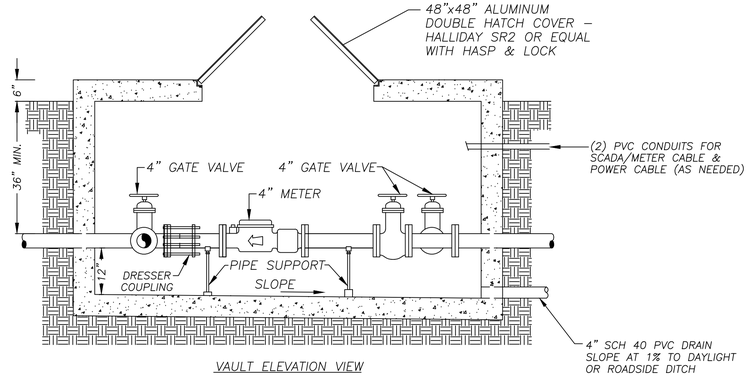
1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU" {SHARED FOR DENNIS & DENNIS/CORINTH METERS}
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. PROVIDE AND INSTALL NEW SS UNI-STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE NEW ANTENNA (INSTALLED ON EXISTING TOWER MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
4. PROVIDE (2 EA.) NEW SYSTEM PRESSURE TRANSDUCERS "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCERS SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR.
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINTS.
5. PROVIDE (1 EA.) AND INSTALL NEW PREFABRICATED CONCRETE DUAL-ZONE MASTER METER VAULT AS SPECIFIED IN THE CONTRACT DOCUMENTS.
6. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE NEW RTU AS REQUIRED.
7. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
8. PROVIDE AND INSTALL (1 EA) NEW 100 AMP 240/120 VAC ELECTRICAL SERVICE AND HARDWARE, INCLUDING (1) MAIN BREAKER AND A MINIMUM OF 4 (EA.) 15AMP SINGLE POLE BREAKERS.
   a. THE OWNER SHALL PROVIDE FOR ALL COORDINATION AND FEES WITH THE UTILITY COMPANY TO HAVE POWER INSTALLED TO THE SITE LOCATION.
   b. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING THE SERVICE PANEL, RELATED INSPECTION FEES AND CONDUIT/WIRING TO THE RTU AS REQUIRED.
9. PROVIDE NEW 4-INCH TURBO FLOW METERS IN DUAL PURPOSE VAULT {TWO TOTAL} (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. INSTALL NEW FLOW METERS IN VAULT. METERS SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO-WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA.
   b. FLOW METERS SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4-20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.PROVIDE (2 EA.) NEW 4 INCH FLOW METERS
10. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS, ETC.
11. CONTRACTOR SHALL REMOVE ANY FORMER STRUCTURES NOT RE-USED.



VAULT & PIPING PLAN VIEW



VAULT ELEVATION VIEW

INSTALLATION NOTES:

1. THE SCADA CONDUIT SHALL BE RIGID PVC WITH SWEEPING BENDS. IT SHALL BE INSTALLED WITH A MINIMUM DEPTH OF 30" WITH A MINIMUM OF 12" FLOWABLE CONCRETE FILL ABOVE. ALSO, AN ELECTRICAL WARNING TAPE SHALL BE INSTALLED IN THE TRENCH, APPROXIMATELY 12" DEEP.
2. NEW VAULT NOTE: ALL CONCRETE SURFACES & PIPING (EXCL. METER) INSIDE THE VALVE VAULT ARE TO RECEIVE A SURFACE PREPARATION AND COATING SYSTEM EQUAL TO THE FOLLOWING TNEMEC SYSTEMS:

CONCRETE FLOOR	SYSTEM 67-1	GRAY (IN05)
OTHER CONCRETE	SYSTEM 66-4	WHITE (WH01)
PIPING, VALVES	SYSTEM 66-2	BLUE (GB03)

SITE #8
ELWD – DENNIS & DENNIS/CORINTH VAULT & PIPING LAYOUT

3 / P6

SCALE: NONE

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1	FOR CONSTRUCTION	06-01-18	CWW
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East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
Dennis & Dennis/Corinth Master Meters
Site Plan & Details

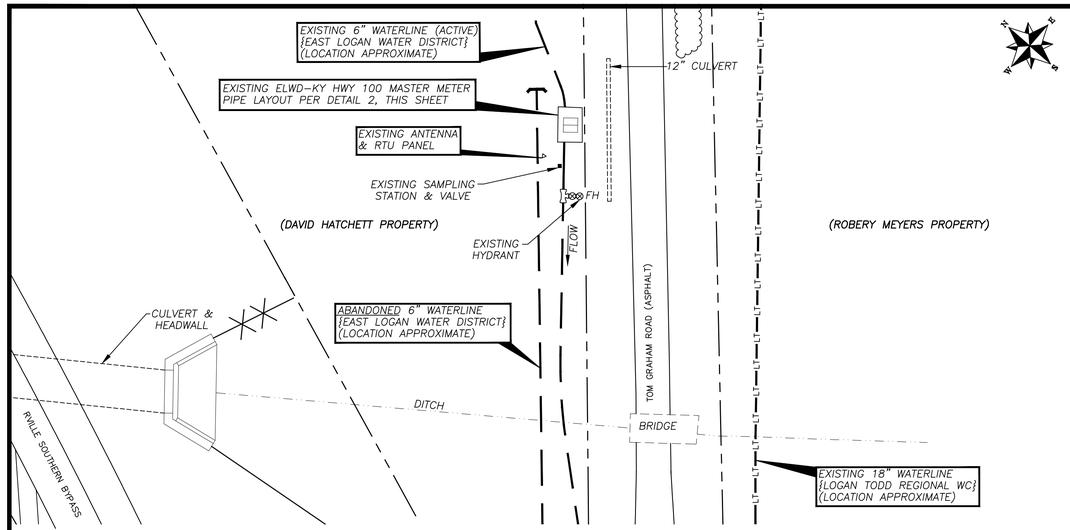
Quality On Tap!

February 14, 2018

Chris Wilcutt, P.E.

DRAWING NO.

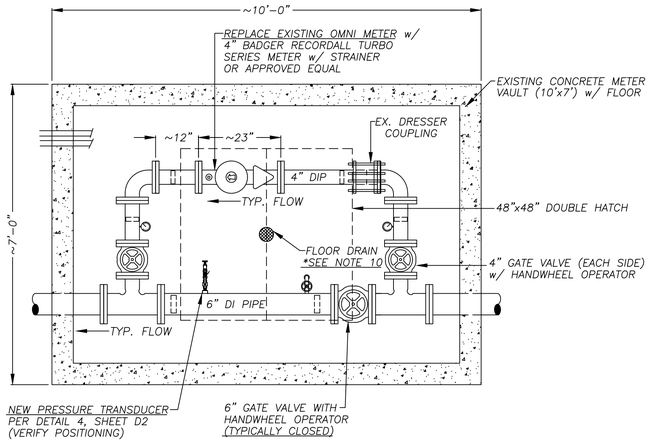
SHEET P-6



SITE #10
ELWD – KY HWY 100 MASTER METER

1 / P7

SCALE: 1"=20'



SITE #10
ELWD – KY HWY 100 VAULT LAYOUT

2 / P7

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU".
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. PROVIDE AND INSTALL (1 EA) NEW SOLAR POWER STATION WITH SOLAR PANEL/S. SOLAR ENCLOSURE TO BE FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE. ENCLOSURE AND SOLAR PANEL TO BE DESIGNED FOR POLE OR WALL MOUNT. INCLUDING: SHORT CIRCUIT PROTECTION, DIGITAL SOLAR CONTROLLER, BATTERIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT
2. PROVIDE AND INSTALL NEW SS UNI-STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE NEW ANTENNA, TOWER MAST, AND COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA TO BE INSTALLED ON PIPE MAST MOUNTED TO THE SS RTU MOUNTING STRUCTURE AT A MINIMUM HEIGHT OF 10 FT.
4. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR.
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
5. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE NEW RTU AS REQUIRED.
6. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
7. PROVIDE NEW 4-INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO-WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4-20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
8. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS, ETC.
9. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
10. CONTRACTOR SHALL CLEAN OUT AND/OR SPOT REPAIR EXISTING DRAIN PIPE TO DITCH TO INSURE PROPER VAULT DRAINAGE.
11. CONTRACTOR SHALL REMOVE ANY FORMER STRUCTURE NOT RE-USED.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

REVISIONS

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202 Ewing Street
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(270) 483-9985

EAST LOGAN WATER DISTRICT
333 South Franklin Street
Russellville, KY 42276
(270) 717-0991

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
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LENGTH OF BAR IS 1"
ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
KY Highway 100 Master Meter
Site Plans & Details

Quality On Tap!

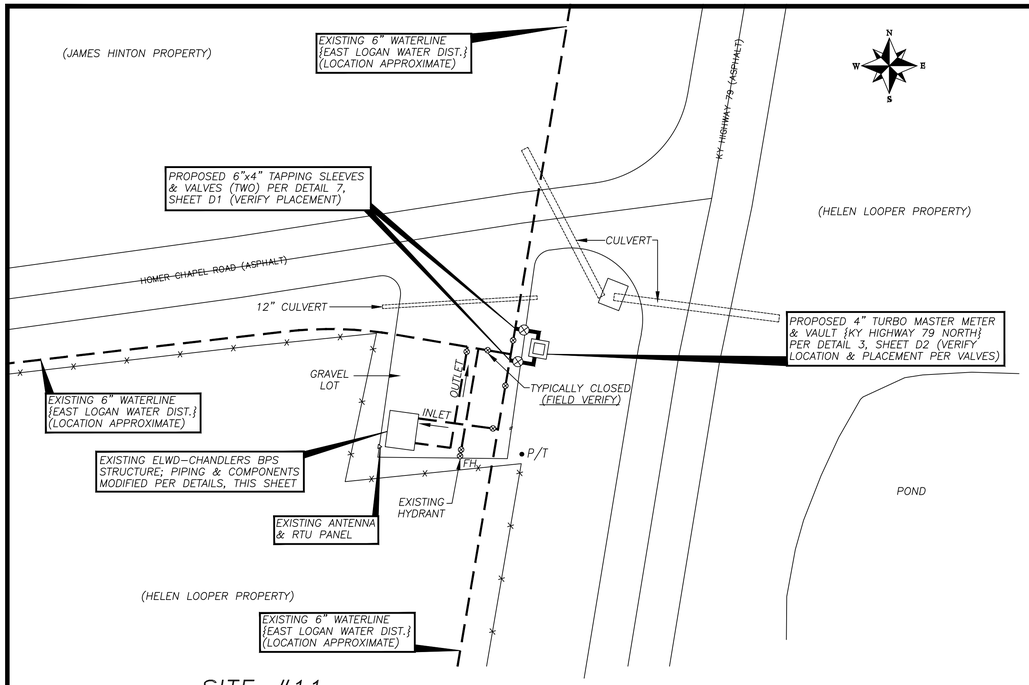
February 14, 2018

STATE OF KENTUCKY
CHRIS WILCUTT 21523
LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

SHEET P-7



SITE #11
ELWD – CHANDLERS BOOSTER PUMP SITE — 1 / P8

SCALE: 1"=20'

GENERAL NOTES:

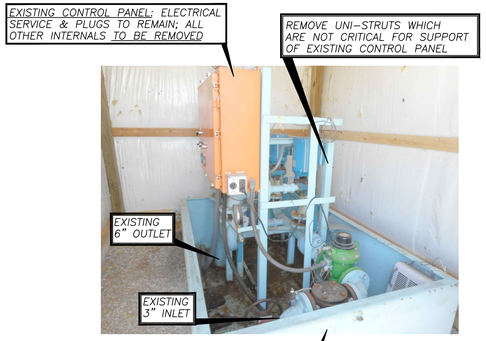
1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT (ELWD) PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (ELWD - CHANDLERS BPS STRUCTURE):

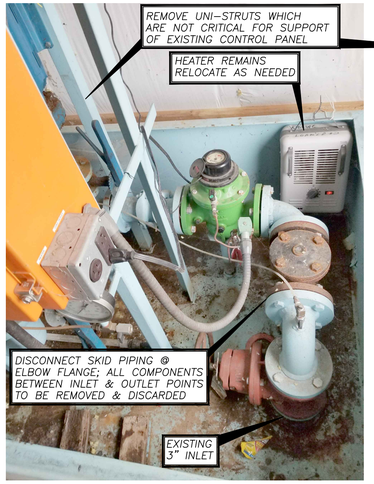
1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU". THE NEW RTU WILL SERVICE & PAIR BOTH THE 'ELWD-CHANDLERS BPS STRUCTURE' AND NEW 'ELWD-KY HIGHWAY 79 NORTH MASTER METER'.
   a. FULLY ASSEMBLED & HOUSED IN A NEMA 12 PAINTED ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERPOSING RELAYS, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. RTU SHALL INCLUDE PROVISIONS TO MONITOR THE REMOTE BEECHLAND STORAGE TANK AND AUTOMATICALLY CONTROL THE LOCAL TANK FILL CONTROL VALVE TO MAINTAIN DESIRED STORAGE TANK LEVEL.
   d. RTU SHALL INCLUDE A LOCAL HAND-OFF-AUTO SWITCH AND INTERPOSING RELAY FOR MANUAL AND PLC VALVE CONTROL
   e. RTU TO INCLUDE A 6.5 INCH COLOR OPERATOR INTERFACE TERMINAL (OIT). OIT SHALL MONITOR AND CONTROL ALL LOCAL CONTROL RTU CONTROL AND INFORMATION FUNCTIONS. OIT FUNCTIONS SHALL BE DUPLICATED ON THE WATER OFFICE SCADA HMI WORKSTATIONS.
2. PROVIDE (1 EA.) ELECTRICALLY OPERATED CONTROL VALVE (CLA-VAL 131 SERIES OR APPROVED EQUAL)
   a. 120VAC OPERATING VOLTAGE
   b. SIZE: 4 INCH
   c. 150 LB FLANGED PIPE CONNECTION
   d. MANUAL OVERRIDE FUNCTION WITH DRY CONTACT.
   e. EQUIPPED WITH LIMIT SWITCH (CLA-VAL X-105L2W LIMIT SWITCH OR APPROVED EQUAL). THE VALVE SHALL ALSO INCLUDE THE VC-22D ELECTRONIC VALVE CONTROLLER AND THE X117 SERIES VALVE POSITION TRANSMITTER
   f. CONTROL VALVE EQUIPPED WITH CHECK FEATURE OPTION
   g. PROVIDE SECONDARY VALVE CONTROLLER AND POSITION FEEDBACK IF NEEDED FOR REMOTE VALVE POSITION CONTROL FROM SCADA.
3. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
4. PROVIDE (1 EA.) NEW 4-INCH ELECTROMAGNETIC FLOW METER (ABB WATERMASTER MAGNETIC FLOW METER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED FLOW HEAD WITH REMOTE MOUNT DIGITAL DISPLAY WITH INTERNAL POWERED 4 TO 20 MA OUTPUT TO SCADA.
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4-20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
5. PROVIDE AND INSTALL NEW SS UNI-STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
6. PROVIDE NEW ANTENNA (UTILIZING EXISTING POLE MAST) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED.
7. UTILIZE EXISTING 120 VAC ELECTRICAL SERVICE. REPAIR OR REPLACE ANY EXISTING CONDUIT OR WIRING AS NEEDED TO ASSURE THERE ARE NO EXPOSED WIRING OR OPEN CONDUIT JOINTS FROM THE POWER PANEL TO THE RTU ENCLOSURE.
8. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE NEW RTU AS REQUIRED.
9. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
10. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, POWER STATUS AND OTHER I/O POINTS AS LISTED.
11. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
12. REMOVE EXISTING PUMPS, MODIFY, REPAIR, REPLACE RELATED PIPING WITH NEW PIPING AND VALVES AS NOTED ON THE CONTRACT PLANS.

SCOPE OF WORK NOTES (ELWD - KY HIGHWAY 79 NORTH MASTER METER {NEW}):

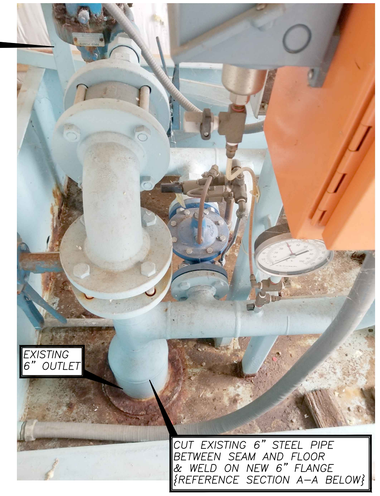
1. CONTRACTOR TO PAIR MASTER METER WITH NEW RTU PANEL INSTALLED WITHIN ELWD STRUCTURE BY PROVIDING ALL NECESSARY COAXIAL CABLE (4 TWISTED PAIR CABLE; 18 AWG), CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT.
2. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
3. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO CONNECT WITH RTU IN ADJACENT STRUCTURE, AS REQUIRED.
4. PROVIDE (1 EA.) AND INSTALL NEW PREFABRICATED CONCRETE MASTER METER VAULT AS SPECIFIED IN THE CONTRACT DOCUMENTS.
5. PROVIDE (1 EA.) NEW 4-INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO-WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4-20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
6. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE. FLOW AND PRESSURE I/O TO CONNECT TO CHANDLERS BPS RTU.
7. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.



CHANDLERS BPS STRUCTURE
OVERALL INTERIOR VIEW (CURRENT)



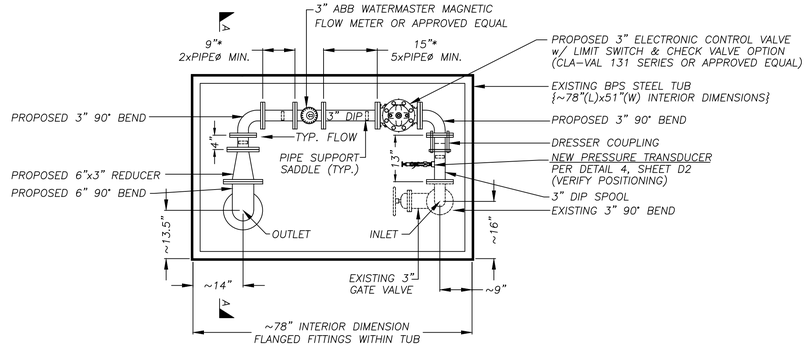
CHANDLERS BPS STRUCTURE
INLET PIPING VIEW (CURRENT)



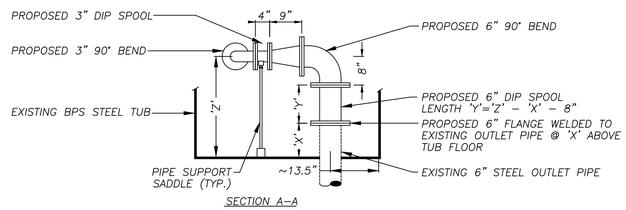
CHANDLERS BPS STRUCTURE
OUTLET PIPING VIEW (CURRENT)

SITE #11
ELWD – CHANDLERS BPS STRUCTURE – DEMO PLAN — 2 / P8

SCALE: NONE



PLAN VIEW



SECTION A-A

SITE #11
ELWD – CHANDLERS BPS STRUCTURE – MODIFICATION — 3 / P8

SCALE: NONE

2	FOR CONSTRUCTION	06-01-18	CWW
1	FOR KDOW REVIEW	02-14-18	CWW
No	Revision	Date	By

REVISIONS

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Guthrie, KY 42234
(270) 483-9985

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:
LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
Chandlers BPS & KY Hwy 79N Master Meter
Site Plan & Details

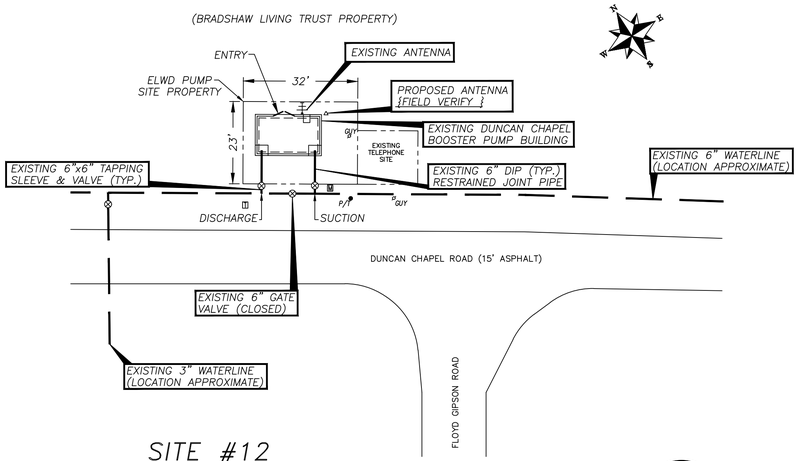
Quality On Tap!

February 14, 2018

Chris Wilcutt, P.E.

DRAWING NO.

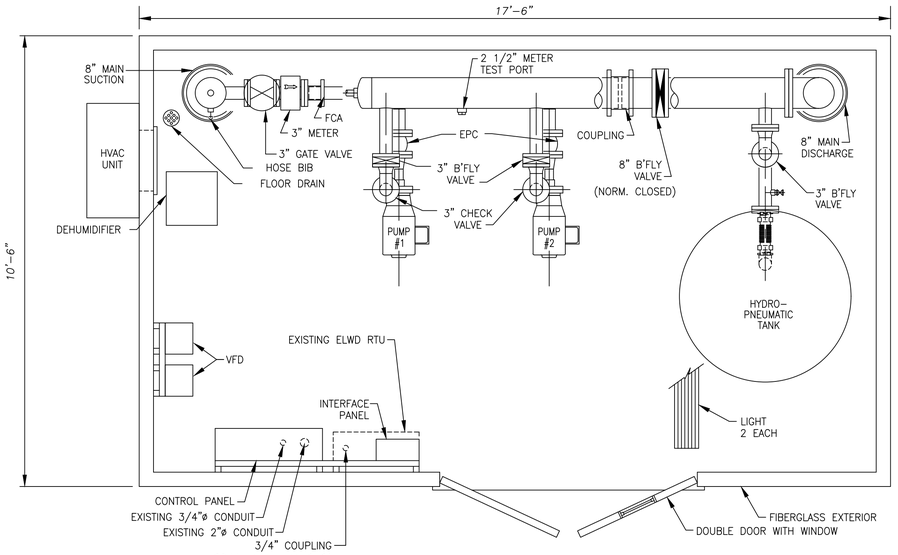
SHEET P-8



SITE #12
ELWD – DUNCAN CHAPEL BPS SITE PLAN

1 / P9

SCALE: 1"=20'



SITE #12
DUNCAN CHAPEL BPS BUILDING LAYOUT

2 / P9

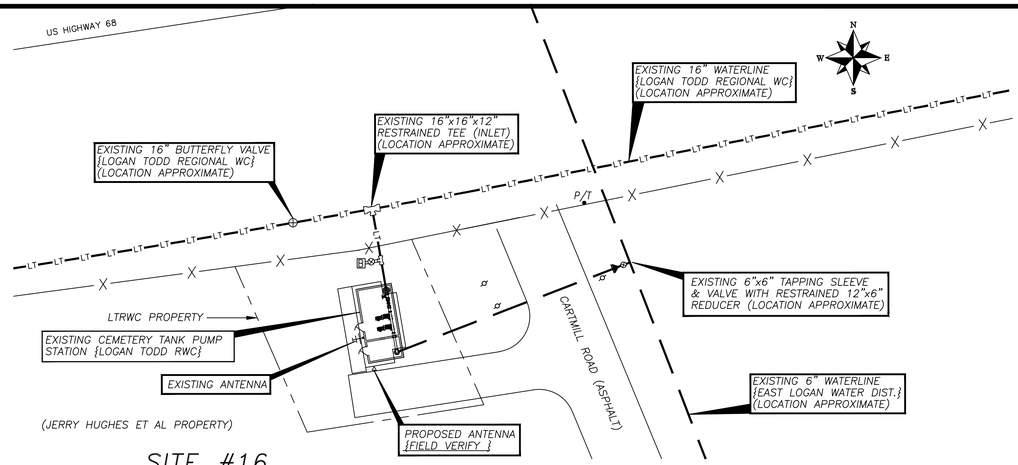
SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ABSOLUTELY NO ROOF PENETRATIONS. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

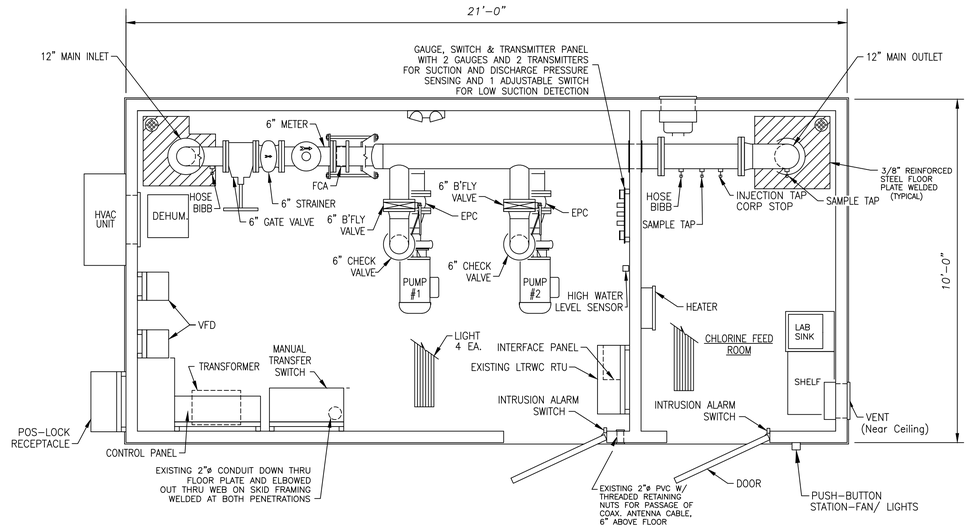
1. REPLACE EXISTING PROGRAMMABLE CONTROLLER AND OPERATOR INTERFACE TERMINAL.
2. REPLACE EXISTING ALLEN–BRADLEY SLC–503 PLC AND RELATED I/O WITH AN ALLEN–BRADLEY MICRO850 SERIES PROGRAMMABLE CONTROLLER AND RELATED 2080 SERIES I/O
   a. ALL EXISTING FIELD I/O POINTS SHALL BE ACCOMMODATED IN THE NEW PLC. PROVISIONS SHALL BE MADE TO ACCOMMODATE ALL PRESENT SPARE I/O POINTS WITH A MINIMUM OF 25% SPARE I/O AT COMPLETION.
   b. REPLACE THE EXISTING ALLEN–BRADLY PANELVIEW "STANDARD" WITH A PANELVIEW PLUS 800 SERIES. THE NEW OIT SHALL HAVE AN ALL TOUCH COLOR SCREEN WITH A SIZE OF 6.5 INCHES OR GREATER.
   c. COMMUNICATIONS BETWEEN THE PLC AND OIT SHALL BE ETHERNET IP.
   d. PROVIDE ALL HARDWARE REQUIRED FOR IP COMMUNICATIONS BETWEEN THE PLC AND OIT, INCLUDING BUT NOT LIMITED TO POWER SUPPLIES, ETHERNET SWITCH, CABLES AND THE LIKE.
   e. ALL EXISTING PLC CONTROL FUNCTIONS SHALL BE PROVIDED FOR IN THE NEW PLC/OIT AND REMOTE SCADA
   f. NO CHANGES TO THE EXISTING PLC CONTROL FUNCTIONS ARE REQUIRED.
3. CONTRACTOR TO PROVIDE AND INSTALL (1 EA) NEW VHF RADIO/MODEM.
4. CONTRACTOR TO PROVIDE AND INSTALL (1 EA.) NEW ANTENNA AND COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
5. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR AUTOMATED DUPLEX PUMP CONTROL, FLOW RATE, FLOW TOTALIZATION, POWER STATUS AND OTHER I/O POINTS AS LISTED.
6. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED
7. PROVIDE A COMPLETE NEW DRAWING SET SHALL BE GENERATED FOR THE EXISTING PLC CONTROL PANEL. THE DRAWING SHALL BE GENERATED IN AUTOCAD ELECTRICAL AND PROVIDED IN PDF FORMAT AT JOBS END. NO HAND DRAWING REVISIONS ARE ALLOWED.



SITE #16
LTRWC – CEMETERY PUMP STATION

3 / P9

SCALE: 1"=20'



SITE #16
LTRWC – PUMP STATION BLDG. LAYOUT

4 / P9

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE LOGAN TODD REGIONAL WATER COMMISSION (LTRWC) PRIOR TO THE START OF WORK AT THIS SITE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED & HOUSED IN A NEMA 12 PAINTED ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. UTILIZE (1 EA) EXISTING LTRWC FLOW TRANSMITTER 4–20MA CURRENT LOOP FOR SYSTEM FLOW RATE/TOTALIZER MONITORING TO THE NEW RTU
3. UTILIZE (2 EA) EXISTING LTRWC PRESSURE TRANSDUCERS 4–20MA CURRENT LOOP FOR SYSTEM PRESSURE MONITORING TO THE NEW RTU
4. SIGNAL ISOLATION:
   a. SHARED 4–20MA SIGNALS BETWEEN LTRWC AND ELWD SHALL UTILIZE SIGNAL ISOLATION DEVICES TO ASSURE PROPER CURRENT LOOP LOADING REQUIREMENTS AND ISOLATION OF PLC INPUTS OF BOTH PARTIES RTU EQUIPMENT.
   b. ALL SIGNAL ISOLATION HARDWARE AND CONFIGURATION SHALL BE PROVIDED UNDER THIS CONTRACT.
   c. SIGNAL ISOLATION SHALL BE CONFIGURED SO THAT MAINTENANCE PERFORMED TO THE ELWD RTU OR RELATED I/O SHALL NOT INTERRUPT 4–20MA SIGNALS TO THE LTRWC RTU.
5. CONTRACTOR TO PROVIDE RADIO COMMUNICATIONS ANTENNA, POLE MAST, COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
6. RTU TO BE INSTALLED INSIDE OF THE EXISTING LTRWC STATION BUILDING. INSTALLATION SHALL BE AS DIRECTED BY THE OWNER/ENGINEER AND COORDINATION WITH THE LOGAN TODD REGIONAL WATER COMMISSION. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ABSOLUTELY NO ROOF PENETRATIONS.
7. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS
8. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

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FIRM: McGhee
DES BY: CWW CHK BY: MWM
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SCALE: AS SHOWN
PROJECT DATE: 2018
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LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
Duncan Chapel PS & LTRWC Cemetery PS
Site Plans & Details

Quality On Tap!

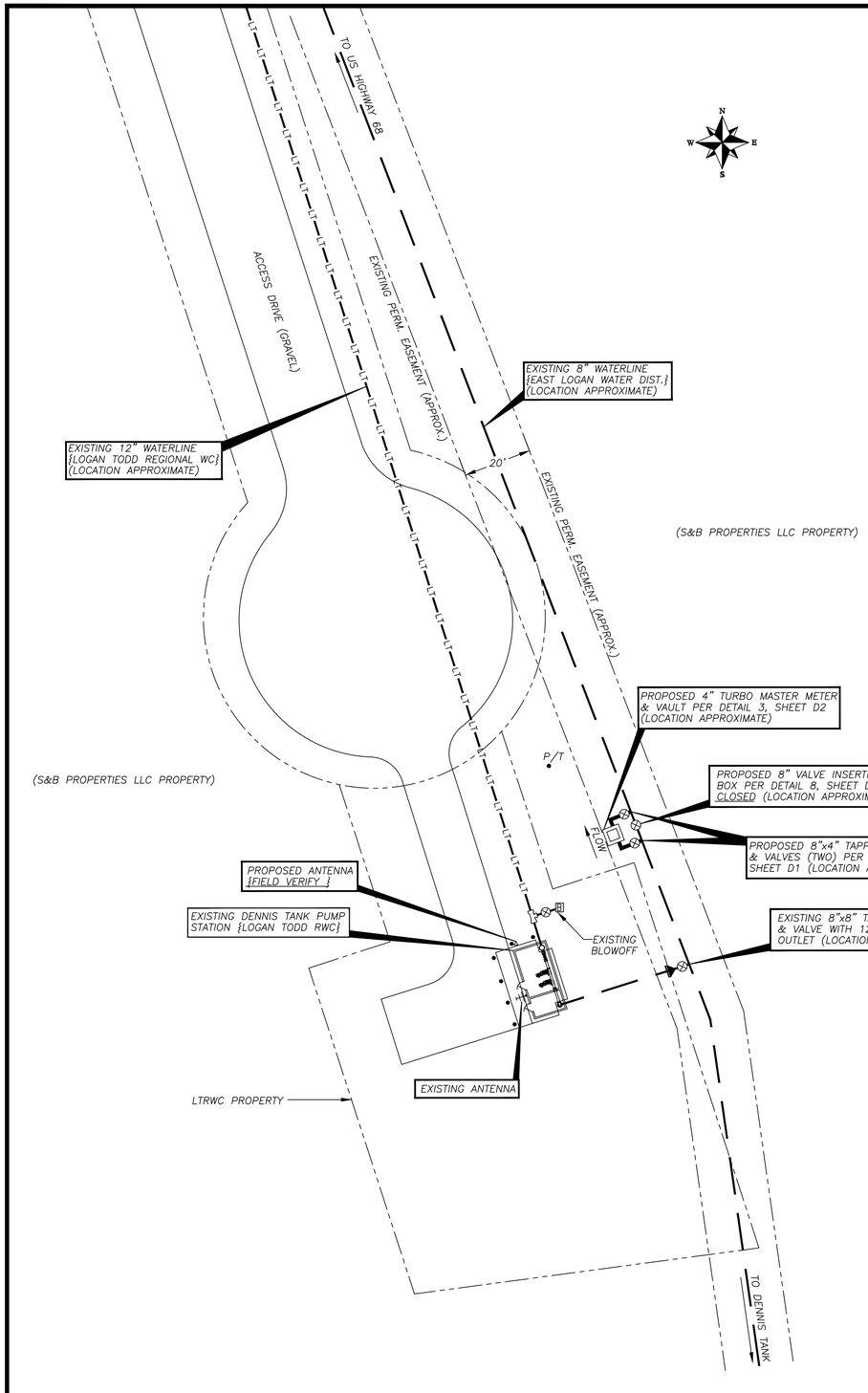
February 14, 2018

STATE OF KENTUCKY CHRIS WILCUTT 21523 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

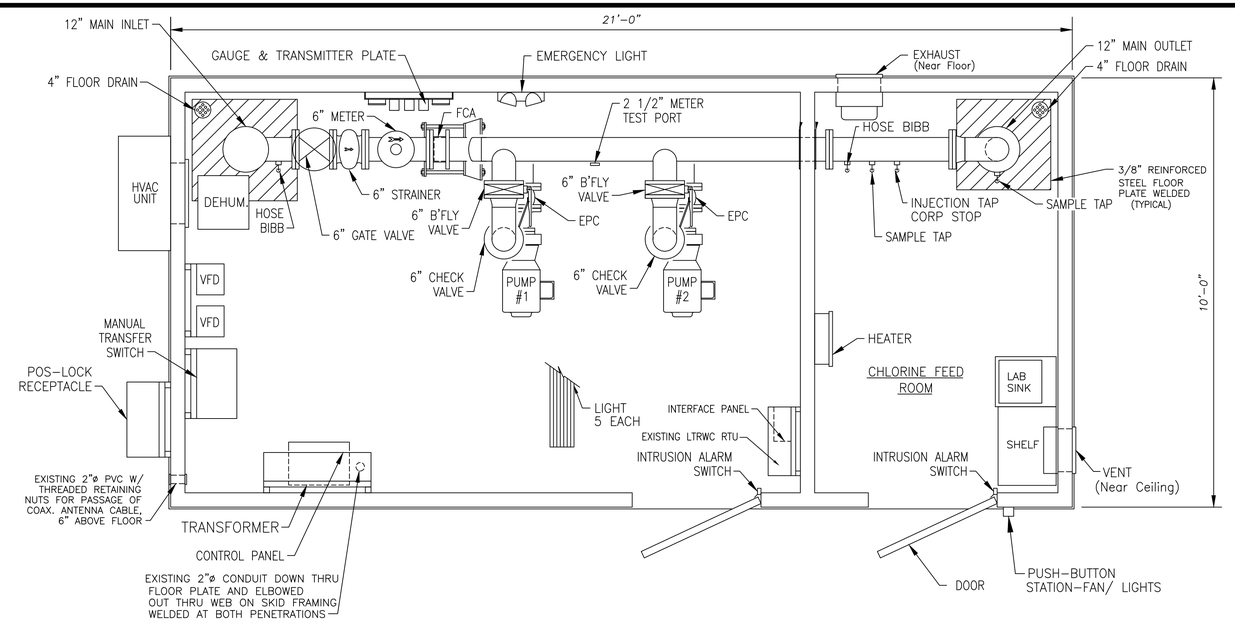
SHEET P-9



SITE #13
LTRWC – DENNIS PUMP STATION AREA

SCALE: 1"=20'

1
P10



SITE #13
LTRWC – DENNIS PS BUILDING LAYOUT

SCALE: NONE

2
P10

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE LOGAN TODD REGIONAL WATER COMMISSION (LTRWC) PRIOR TO THE START OF WORK AT THIS SITE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (LTRWC - DENNIS PUMP STATION):

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU". THE NEW RTU WILL SERVICE & PAIR BOTH THE 'LTRWC–DENNIS PUMP STATION' AND NEW 'DENNIS MASTER METER'.
   a. FULLY ASSEMBLED & HOUSED IN A NEMA 12 PAINTED ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. UTILIZE (1 EA) EXISTING LTRWC FLOW TRANSMITTER 4–20MA CURRENT LOOP FOR SYSTEM FLOW RATE/TOTALIZER MONITORING TO THE NEW RTU
3. UTILIZE (2 EA) EXISTING LTRWC PRESSURE TRANSDUCERS 4–20MA CURRENT LOOP FOR SYSTEM PRESSURE MONITORING TO THE NEW RTU
4. SIGNAL ISOLATION:
   a. SHARED 4–20MA SIGNALS BETWEEN LTRWC AND ELWD SHALL UTILIZE SIGNAL ISOLATION DEVICES TO ASSURE PROPER CURRENT LOOP LOADING REQUIREMENTS AND ISOLATION OF PLC INPUTS OF BOTH PARTIES RTU EQUIPMENT.
   b. ALL SIGNAL ISOLATION HARDWARE AND CONFIGURATION SHALL BE PROVIDED UNDER THIS CONTRACT.
   c. SIGNAL ISOLATION SHALL BE CONFIGURED SO THAT MAINTENANCE PERFORMED TO THE ELWD RTU OR RELATED I/O SHALL NOT INTERRUPT 4–20MA SIGNALS TO THE LTRWC RTU.
5. CONTRACTOR TO PROVIDE RADIO COMMUNICATIONS ANTENNA, POLE MAST, COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT. ANTENNA POSITIONG/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
6. RTU TO BE INSTALLED INSIDE OF THE EXISTING LTRWC STATION BUILDING. INSTALLATION SHALL BE AS DIRECTED BY THE OWNER/ENGINEER AND COORDINATION WITH THE LOGAN TODD REGIONAL WATER COMMISSION. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ABSOLUTELY NO ROOF PENETRATIONS.
7. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS
8. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

SCOPE OF WORK NOTES (ELWD - DENNIS MASTER METER {NEW}):

1. CONTRACTOR TO PAIR MASTER METER WITH NEW RTU PANEL INSTALLED WITHIN LTRWC STRUCTURE BY PROVIDING ALL NECESSARY COAXIAL CABLE (4 TWISTED PAIR CABLE; 18 AWG), CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT.
2. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
3. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO CONNECT WITH RTU AS REQUIRED.
4. PROVIDE (1 EA.) AND INSTALL NEW PREFABRICATED CONCRETE MASTER METER VAULT AS SPECIFIED IN THE CONTRACT DOCUMENTS.
5. PROVIDE (1 EA.) NEW 4–INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
6. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
7. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED

SCOPE OF WORK NOTES (ELWD - DENNIS TANK {NOT SHOWN}):

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU" TO REPLACE EXISTING RTU AT TANK SITE.
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE (1 EA.) NEW NEMA 4X HEATED TRANSDUCER ENCLOSURE PANEL
   a. NEW TANK LEVEL PRESSURE TRANSDUCER WITH INTEGRAL DIGITAL DISPLAY.
   b. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR
4. PROVIDE NEW ANTENNA (UTILIZING EXISTING POLE MAST ON TOP OF TANK) PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
5. UTILIZE EXISTING 120 VAC ELECTRICAL SERVICE. REPAIR OR REPLACE ANY EXISTING CONDUIT OR WIRING AS NEEDED TO ASSURE THERE ARE NO EXPOSED WIRING OR OPEN CONDUIT JOINTS FROM THE POWER PANEL TO THE RTU ENCLOSURE.
6. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO CONNECT RTU AS REQUIRED.
7. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
8. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR TANK LEVEL MEASUREMENT, POWER STATUS.
9. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

REVISIONS

EAST LOGAN WATER DISTRICT
333 South Franklin Street
Russellville, KY 42276
(270) 717-0991

McGHEE ENGINEERING
202 Ewing Street
Guthrie, KY 42234
(270) 483-9985

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:
LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
LTRWC Dennis Pump Station Area
Site Plans & Details

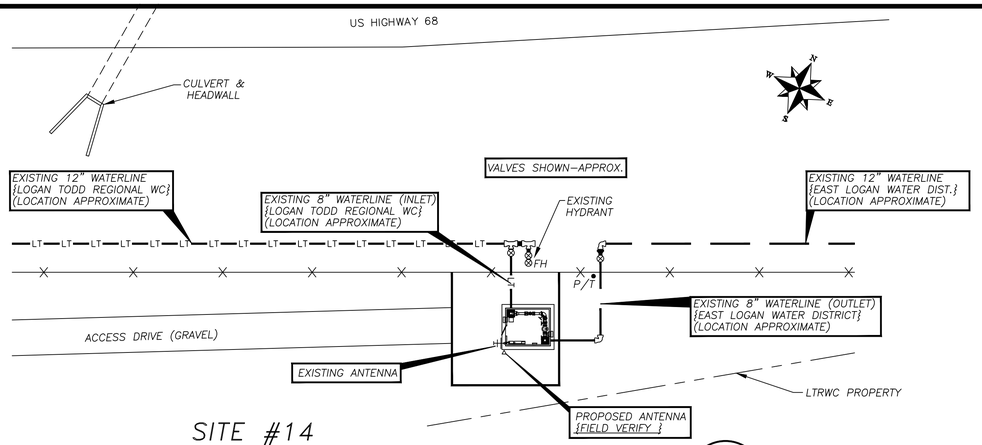
Quality On Tap!

February 14, 2018

Chris Wilcutt, P.E.

DRAWING NO.

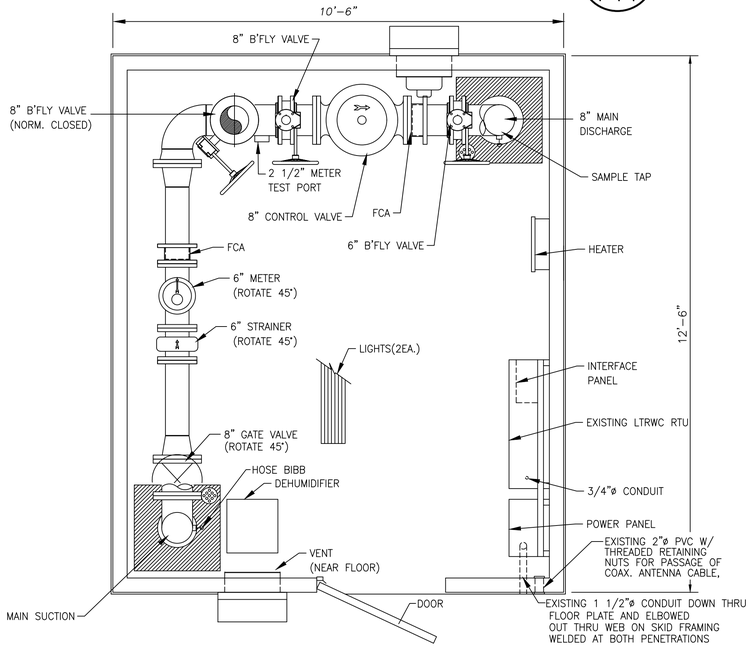
SHEET P-10



SITE #14
LTRWC – SHAKERTOWN METER STATION

1 / P11

SCALE: 1"=20'



SITE #14
SHAKERTOWN METER BUILDING LAYOUT

2 / P11

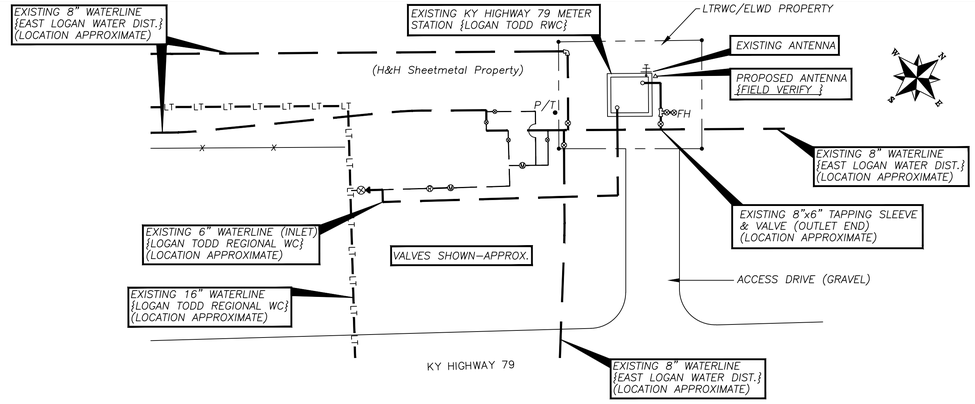
SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE LOGAN TODD REGIONAL WATER COMMISSION (LTRWC) PRIOR TO THE START OF WORK AT THIS SITE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

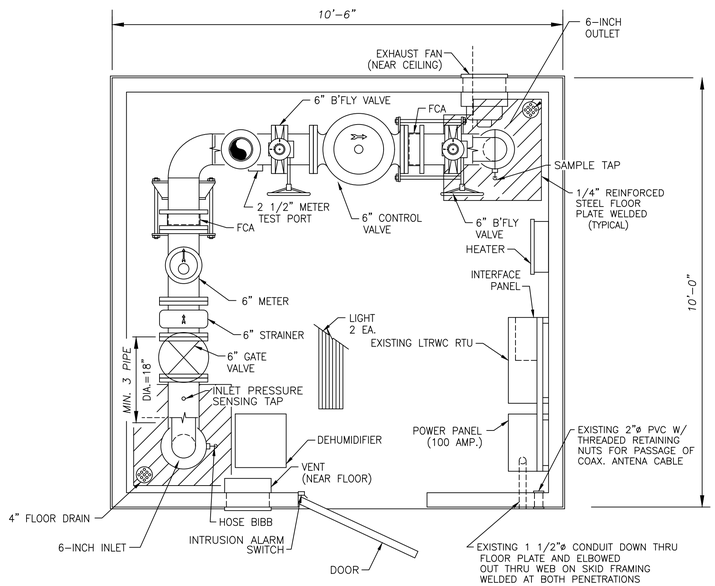
1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED, HOUSED IN A NEMA 12 PAINTED ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. UTILIZE (1 EA) EXISTING LTRWC FLOW TRANSMITTER 4–20MA CURRENT LOOP FOR SYSTEM FLOW RATE/TOTALIZER MONITORING TO THE NEW RTU
3. UTILIZE (2 EA) EXISTING LTRWC PRESSURE TRANSDUCERS 4–20MA CURRENT LOOP FOR SYSTEM PRESSURE MONITORING TO THE NEW RTU
4. SIGNAL ISOLATION:
   a. SHARED 4–20MA SIGNALS BETWEEN LTRWC AND ELWD SHALL UTILIZE SIGNAL ISOLATION DEVICES TO ASSURE PROPER CURRENT LOOP LOADING REQUIREMENTS AND ISOLATION OF PLC INPUTS OF BOTH PARTIES RTU EQUIPMENT.
   b. ALL SIGNAL ISOLATION HARDWARE AND CONFIGURATION SHALL BE PROVIDED UNDER THIS CONTRACT.
   c. SIGNAL ISOLATION SHALL BE CONFIGURED SO THAT MAINTENANCE PERFORMED TO THE ELWD RTU OR RELATED I/O SHALL NOT INTERRUPT 4–20MA SIGNALS TO THE LTRWC RTU.
5. CONTRACTOR TO PROVIDE RADIO COMMUNICATIONS ANTENNA, POLE MAST, COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT. ANTENNA POSITION DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
6. RTU TO BE INSTALLED INSIDE OF THE EXISTING LTRWC STATION BUILDING. INSTALLATION SHALL BE AS DIRECTED BY THE OWNER/ENGINEER AND COORDINATION WITH THE LOGAN TODD REGIONAL WATER COMMISSION. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ABSOLUTELY NO ROOF PENETRATIONS.
7. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
8. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.



SITE #15
LTRWC – KY HWY 79 METER STATION

3 / P11

SCALE: 1"=20'



SITE #15
KY HIGHWAY 79 METER BUILDING LAYOUT

4 / P11

SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE LOGAN TODD REGIONAL WATER COMMISSION (LTRWC) PRIOR TO THE START OF WORK AT THIS SITE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED & HOUSED IN A NEMA 12 PAINTED ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. UTILIZE (1 EA) EXISTING LTRWC FLOW TRANSMITTER 4–20MA CURRENT LOOP FOR SYSTEM FLOW RATE/TOTALIZER MONITORING TO THE NEW RTU
3. UTILIZE (2 EA) EXISTING LTRWC PRESSURE TRANSDUCERS 4–20MA CURRENT LOOP FOR SYSTEM PRESSURE MONITORING TO THE NEW RTU
4. SIGNAL ISOLATION:
   a. SHARED 4–20MA SIGNALS BETWEEN LTRWC AND ELWD SHALL UTILIZE SIGNAL ISOLATION DEVICES TO ASSURE PROPER CURRENT LOOP LOADING REQUIREMENTS AND ISOLATION OF PLC INPUTS OF BOTH PARTIES RTU EQUIPMENT.
   b. ALL SIGNAL ISOLATION HARDWARE AND CONFIGURATION SHALL BE PROVIDED UNDER THIS CONTRACT.
   c. SIGNAL ISOLATION SHALL BE CONFIGURED SO THAT MAINTENANCE PERFORMED TO THE ELWD RTU OR RELATED I/O SHALL NOT INTERRUPT 4–20MA SIGNALS TO THE LTRWC RTU.
5. CONTRACTOR TO PROVIDE RADIO COMMUNICATIONS ANTENNA, POLE MAST COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT. ANTENNA POSITION DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
6. RTU TO BE INSTALLED INSIDE OF THE EXISTING LTRWC STATION BUILDING. INSTALLATION SHALL BE AS DIRECTED BY THE OWNER/ENGINEER AND COORDINATION WITH THE LOGAN TODD REGIONAL WATER COMMISSION. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ABSOLUTELY NO ROOF PENETRATIONS.
7. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS
8. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.

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McGHEE ENGINEERING
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Guthrie, KY 42234
(270) 483-9985

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DES BY: CWW CHK BY: MWM
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East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
LTRWC Shakertown & LTRWC KY Hwy 79
Site Plans & Details

Quality On Tap!

February 14, 2018

COMMONWEALTH OF KENTUCKY CHRIS WILCUTT 21523 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

SHEET P-11

SITE #17
EAST LOGAN WATER OFFICE: LOCATION

1 / P12

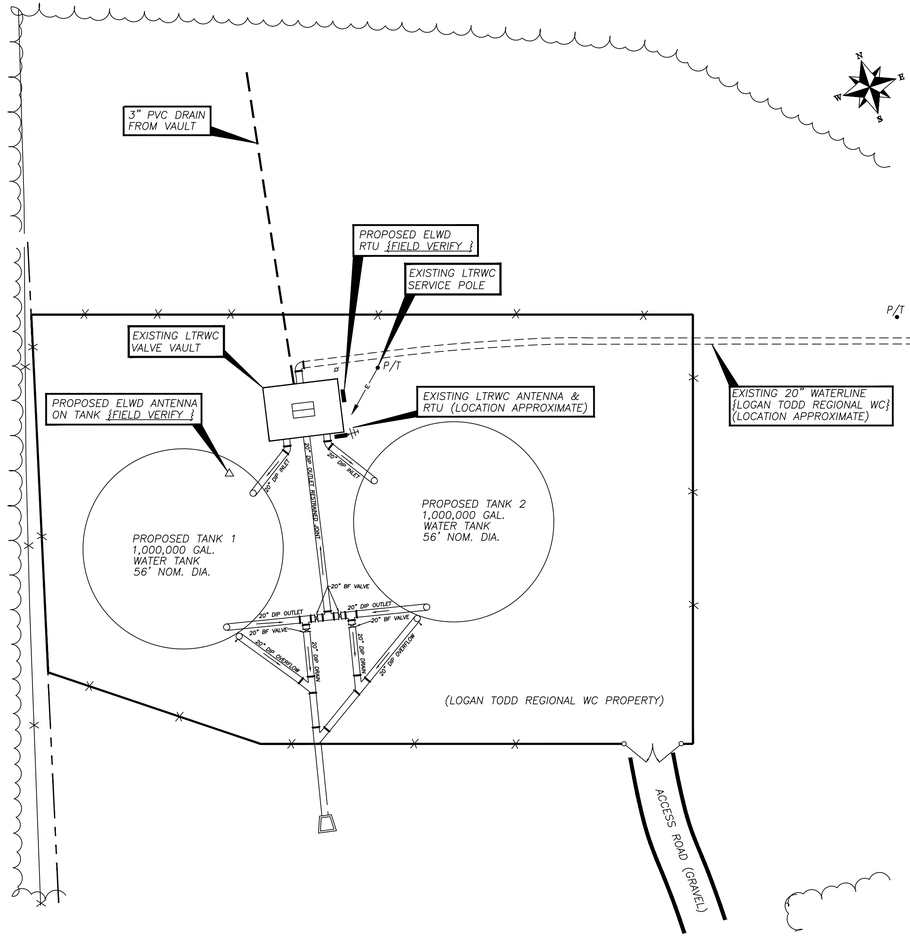
SCALE: NONE

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & BUILDING PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ABSOLUTELY NO ROOF PENETRATIONS. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (2 EA.) NEW SCADA WORKSTATION COMPUTERS.
   a. PROVIDE (2 EA.) 27 INCH LED–BACKLIT LCD MONITOR
   b. PROVIDE (1 EA.) 42 INCH LED–BACKLIT LCD FLAT PANEL DISPLAY WITH HDMI PORT
   c. PROVIDE WALL MOUNT HARDWARE WITH CABLING TO BE INCLUDED
2. PROVIDE (2 EA.) NEW 1500VA UPS WITH AVR FOR SERVER WORKSTATION COMPUTERS.
3. PROVIDE (2 EA.) NEW EXTERNAL HARD DRIVES WITH AUTO BACKUP SOFTWARE.
4. PROVIDE (1 EA.) NEW COLOR PRINTER FOR SCADA COMPUTER USE.
5. PROVIDE (1 EA.) VERSION UPGRADE OF EXISTING FACTORY TALK VIEW STUDIO SE FOR FACTORY TALK VIEW.
6. PERFORM (1 EA.) UPGRADE OF EXISTING FACTORY TALK STATION SE FROM 25 TO 100 DISPLAY.
7. PROVIDE (1 EA.) NEW FACTORY TALK STATION SE 100 DISPLAY.
8. PROVIDE (2 EA.) NEW ROCKWELL SOFTWARE USB DONGLE "GENERATION II".
9. PROVIDE (1 EA.) NEW ROCKWELL RSLogix 5000 LITE.
10. PROVIDE (1 EA.) NEW ROCKWELL CONNECTED COMPONENTS WORKBENCH DEVELOPER.
11. PROVIDE (1 EA.) VERSION UPGRADE OF EXISTING SYTECH REPORTER REPORTING SOFTWARE.
12. PROVIDE (1 EA.) NEW WIN911 "INTERACTIVE" REMOTE ALARMING SOFTWARE.
13. PROVIDE (1 EA.) NEW SCADA MASTER TERMINAL UNIT "MTU".
    a. FULLY ASSEMBLED HOUSED IN A NEMA 12 ENCLOSURE.
    b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, ETHERNET SWITCH, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
14. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR PROVIDED SCADA COMPUTERS, MTU UNIT AND RELATED HMI, REPORTING AND ALARMING SOFTWARE. ALSO, INCLUDE ALL REQUIRED PROGRAMMING AND DEVELOPMENT FOR A COMPLETE AND WORKING SYSTEM FOR REMOTE CONTROL, MONITORING, DATA COLLECTION, LOGGING, TRENDING, ALARMING, REPORTING AND OTHER FEATURES AS REQUIRED BY THE CONTRACT DOCUMENTS.
15. PROVIDE INTEROFFICE LAN HARDWARE AND INSTALLATION AS REQUIRED TO CONNECT ALL (2 EA.) SCADA COMPUTERS AND MTU VIA ETHERNET IP.
16. PROVIDE AND INSTALL (1 EA.) FREE STANDING ALUMINUM RADIO COMMUNICATIONS TOWER WITH A HEIGHT AS REQUIRED BY RADIO PATH STUDY RESULTS. (MAXIMUM HEIGHT = 40 FEET; UNLESS WAIVER GRANTED BY RUSSELLVILLE CODE ENFORCEMENT).
    a. INCLUDE RADIO COMMUNICATIONS ANTENNA, COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT.
    b. CONTRACTOR SHALL OBTAIN ANY NEEDED PERMIT AND PAY RELATED FEES AS APPLICABLE. CONTACT BILL PEARSON (270.726.5022; RUSSELLVILLE).
17. THE CONTRACTOR SHALL PROVIDE FOR THE APPLICATION AND COORDINATION OF A VHF RADIO FREQUENCY LICENSE ASSIGNED FOR DEDICATED SCADA SYSTEM USE AND PLACED IN THE NAME OF THE OWNER. THE LICENSE SHALL ACCOMMODATE APPROPRIATE RADIO POWER OUTPUT, GAIN AND ANTENNA HEIGHTS TO ACCOMMODATE ADEQUATE SYSTEM WIDE COVERAGE AREA WITH A MINIMUM FADE MARGIN OF 25dB. THE LICENSE SHALL BE EFFECTIVE FOR 10 YEARS FROM THE DATE OF FREQUENCY ASSIGNMENT APPROVAL BY THE FCC. THE MASTER UNIT AND ALL REMOTE SITES IMPLEMENTED UNDER THIS PROJECT SHALL BE INCLUDED. ALL FEES AND ADMINISTRATION SHALL BE PROVIDED BY THE CONTRACTOR. A ONE YEAR CONSTRUCTION NOTICE FEE FOR ALL SITES SHALL BE INCLUDED.
18. THE BIDDER/CONTRACTOR SHALL PERFORM A COMPUTER–GENERATED RADIO PATH ANALYSIS PRIOR TO THE BID. THE PATH ANALYSIS SHALL INCLUDE ALL PROPOSED SITES USING ACTUAL SITE COORDINATES AND ELEVATIONS. ON SITE PHYSICAL RADIO PATH TESTING WITH RADIO EQUIPMENT SIMILAR TO THE EQUIPMENT SPECIFIED IN THE CONTRACT DOCUMENTS MAY BE USED IN LIEU OF A COMPUTER–GENERATED RF PATH STUDY. THE PATH STUDY METHOD AND RESULTS MUST BE PROVIDED WITH THE BID DOCUMENTS & PROVIDE PROJECTED FADE MARGINS FOR ALL RF PATH LINKS BETWEEN SITES.
19. REMOTE ACCESS TO (1 EA.) WATER OFFICE SCADA COMPUTER AND ALL HMI SCREENS FOR MONITORING AND CONTROL SHALL BE AVAILABLE REMOTELY VIA THE INTERNET BY THE OWNER. REMOTE ACCESS SHALL UTILIZE THE OWNERS EXISTING WATER OFFICE INTERNET CONNECTION AND A SECURE REMOTE CONNECTION USING ANY STANDARD INTERNET BROWSER CONNECTED PERSONAL COMPUTER, ANDROID OR IPHONE DEVICE. THE REMOTE CONNECTION SOFTWARE SHALL UTILIZE A SECURE CONNECTION VIA SSL/TLS SECURITY AUTHENTICATION. AUDITING AND LOGGING OF USER CONNECTIONS SHALL BE INTEGRAL TO THE REMOTE ACCESS SOFTWARE. THE REMOTE ACCESS SOFTWARE SHALL ALLOW ONE ACTIVE USER CONNECTION PER SESSION. UPON LOGIN TO THE SCADA PC VIA THE REMOTE CONNECTIONS SOFTWARE, THE USER MUST ALSO HAVE TO LOG IN USING A WINDOWS USERNAME AND PASSWORD. THE SYSTEMS INTEGRATOR SHALL SETUP THE REMOTE CONNECTION AND WINDOWS LOGIN CREDENTIALS USING GOOD INDUSTRY PRACTICES FOR SECURE CONNECTIONS. A ONE–YEAR SUBSCRIPTION TO THE REMOTE ACCESS SOFTWARE SHALL BE INCLUDED IN THE BID. THE REMOTE CONNECTION SOFTWARE/SERVICE SHALL BE LOGMEIN.COM PRO OR APPROVED EQUAL.
20. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.



SITE #18
LTRWC – RUSSELLVILLE TANKS: TANK SITE

2 / P12

SCALE: 1"=20'

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK SHALL BE COORDINATED WITH THE LOGAN TODD REGIONAL WATER COMMISSION (LTRWC) PRIOR TO THE START OF WORK AT THIS SITE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED & HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. CONTRACTOR TO PROVIDE PROVIDE AND INSTALL (1 EA.) NEW ANTENNA AND COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
   a. ANTENNA TO BE LOCATED ON TOP OF LTRWC RUSSELLVILLE STANDPIPE TANK
   b. ANTENNA TO BE SECURELY MOUNTED IN A PROFESSIONAL MANOR WITH CONSIDERATION OF RF SEPARATION WITH ADJACENT ANTENNAS.
   c. COAX CABLE TO BE GROUNDED AND BONDED
3. UTILIZE EXISTING 120 VAC ELECTRICAL SERVICE
   a. PROVIDE AND INSTALL NEW CONDUIT AND WIRING FROM ELECTRICAL SERVICE TO THE NEW RTU AS REQUIRED.
   b. CONDUIT SHALL BE INSTALLED UNDERGROUND WHERE POSSIBLE.
   c. ALL CONDUIT SHALL BE SECURELY FASTENED IN A NEAT AND ORDERLY FASHION FOLLOWING STANDARD INDUSTRY PRACTICES.
   d. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED
4. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RADIO REPEATER RTU TO RELAY ASSOCIATED SYSTEM RF DATA TO MONITOR AND CONTROL LOCAL AND REMOTE FUNCTIONS AS REQUIRED.

No	Revision	Date	By
1	FOR CONSTRUCTION	06-01-18	CWW
2	FOR KDOW REVIEW	02-14-18	CWW

REVISIONS

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PROJECT DATE: 2018
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LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS
ELWD Office & LTRWC Russellville Tanks
Site Plans & Details

Quality On Tap!

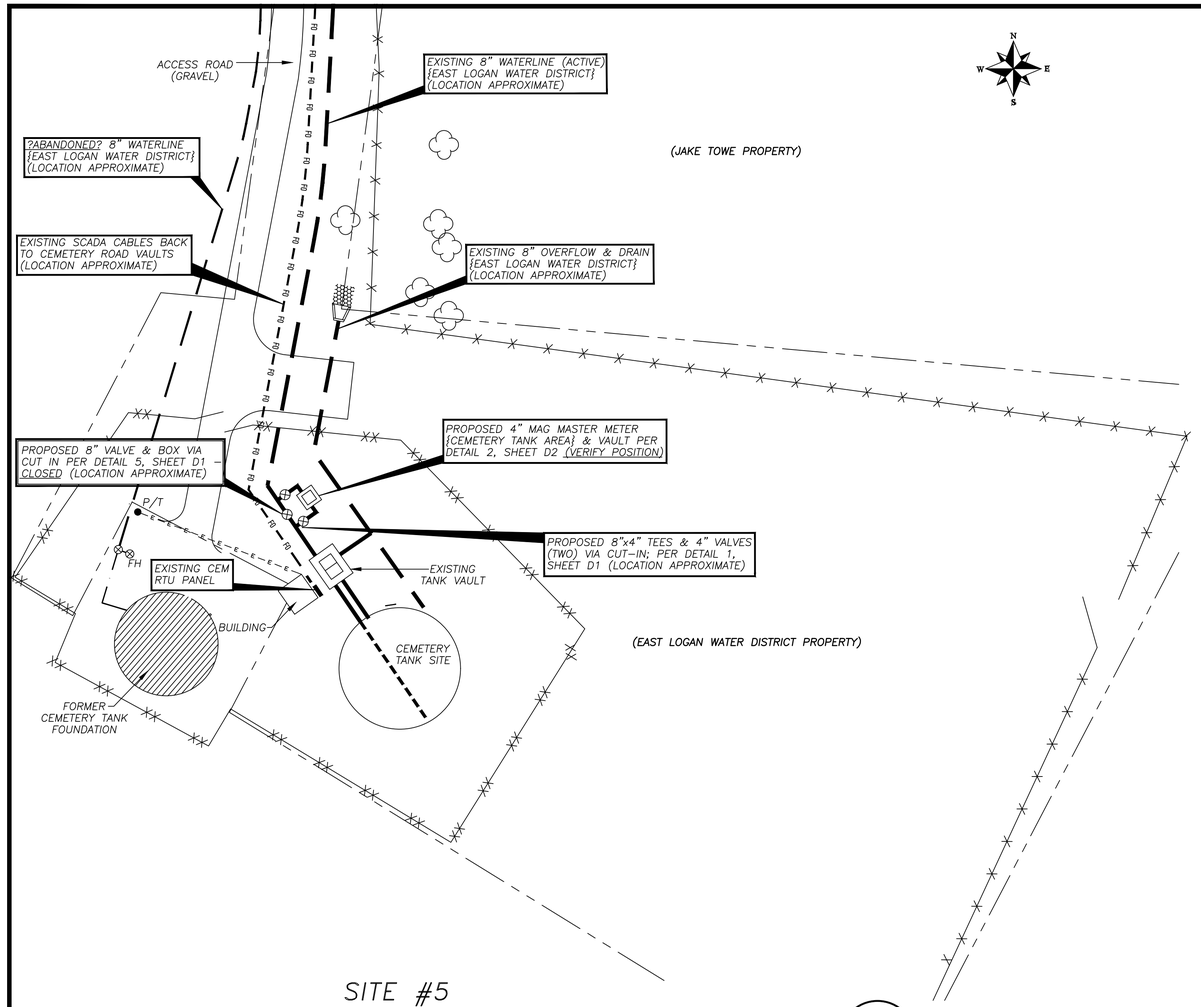
February 14, 2018

COMMONWEALTH OF KENTUCKY
CHRIS WILCUTT 21523
LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

SHEET P-12



SITE #5
ELWD – CEMETERY TANK MASTER METER

1 / P13

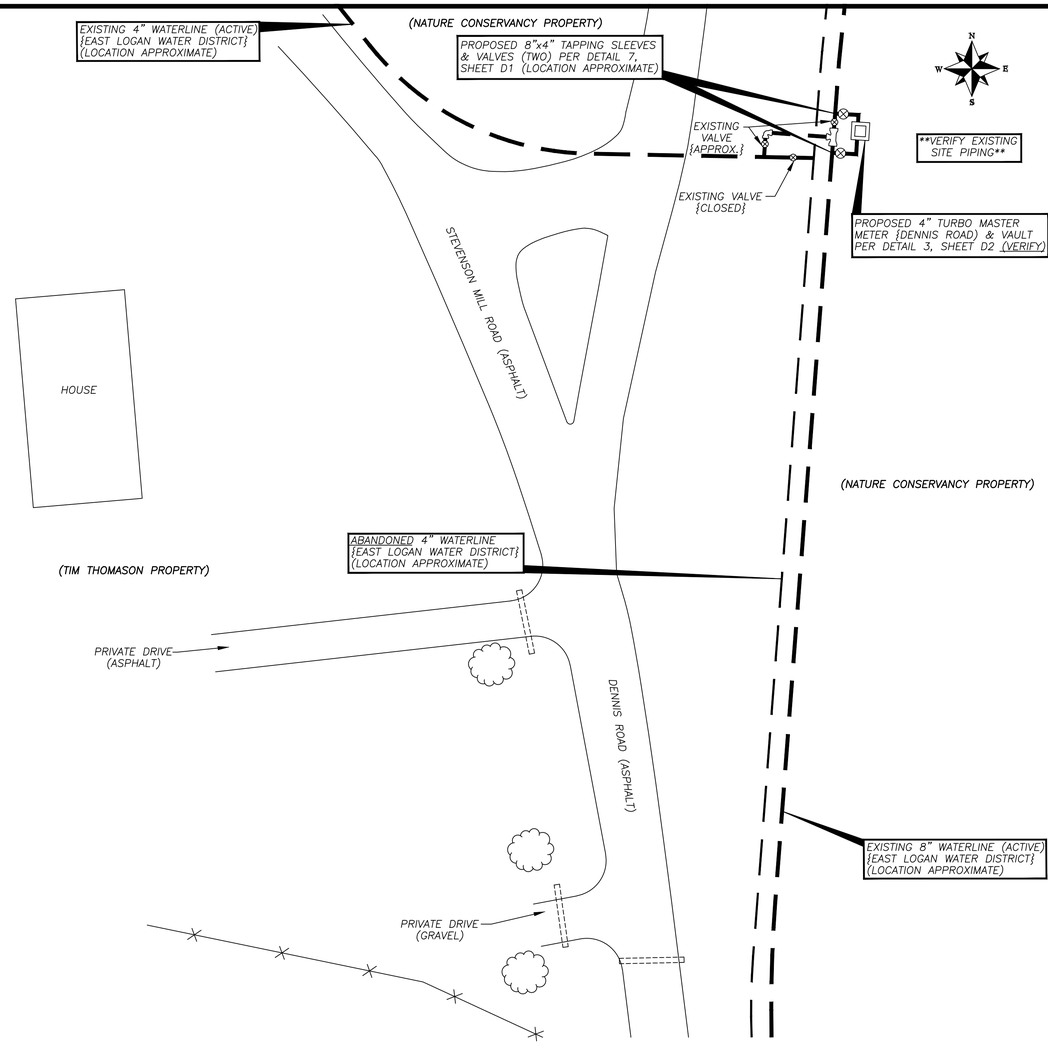
SCALE: 1"=20'

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW 120VAC POWERED SCADA REMOTE TERMINAL UNIT "RTU" TO REPLACE EXISTING RTU AT TANK SITE.
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE (1 EA.) NEW TANK LEVEL PRESSURE TRANSDUCER WITH INTEGRAL DIGITAL DISPLAY. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR.
4. PROVIDE (1 EA.) AND INSTALL NEW ANTENNA PLUS COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA TO BE LOCATED ON TOP OF CEMETERY STANDPIPE TANK, AND IT SHALL BE SECURELY MOUNTED IN A PROFESSIONAL MANOR WITH CONSIDERATION OF RF SEPARATION WITH ADJACENT ANTENNAS. COAX CABLE TO BE GROUNDED AND BONDED.
5. ANTENNA POSITIONING/HEIGHT DETERMINED BY SCADA INTEGRATOR'S RADIO PATH STUDY.
6. UTILIZE EXISTING 120 VAC ELECTRICAL SERVICE. REPAIR OR REPLACE ANY EXISTING CONDUIT OR WIRING AS NEEDED TO ASSURE THERE ARE NO EXPOSED WIRING OR OPEN CONDUIT JOINTS FROM THE POWER PANEL TO THE RTU ENCLOSURE.
7. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE NEW RTU AS REQUIRED. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
8. EXISTING MULTI–CONDUCTOR CABLE FROM THE CEMETERY ROAD METER VAULTS (2; NOT SHOWN) TO THE TANK LOCATION ARE TO BE RE–USED. THE CABLE IS ASSUMED TO BE IN GOOD WORKING ORDER WITH SUFFICIENT CONDUCTOR COUNT. IF NEW CABLING IS REQUIRED, THE SUPPLEMENTAL BID ITEM FOR SUCH WILL BE UTILIZED. A NEW CABLE WOULD BE INSTALLED IN A 1.5" DIAMETER (MIN.) CONDUIT, AND THE CABLE WOULD BE AS FOLLOWS: INSTRUMENTATION CABLE, TYPE PLTC , TYPE ITC, 300V, 8 TWISTED PAIRS, 16 AWG, PVC CONDUCTOR INSULATION MATERIAL, BLACK AND WHITE NUMBERED PAIRS, OVERALL SHIELDED, PVC JACKET.
9. PROVIDE (1 EA.) AND INSTALL NEW PREFABRICATED CONCRETE MASTER METER VAULT WITH PIPING AS SPECIFIED IN THE CONTRACT DOCUMENTS.
10. PROVIDE (1 EA.) NEW 4–INCH ELECTROMAGNETIC FLOW METER (ABB WATERMASTER MAGNETIC FLOW METER OR APPROVED EQUAL)
    a. PROVIDE AND INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED FLOW HEAD WITH REMOTE MOUNT DIGITAL DISPLAY WITH INTERNAL POWERED 4 TO 20 MA OUTPUT TO SCADA
    b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
    c. REMOTE FLOW TRANSMITTER TO BE HOUSED IN A SECONDARY NEMA 4 SS ENCLOSURE OR MOUNTED IN THE NEW RTU ENCLOSURE.
    d. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
11. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR TANK LEVEL MEASUREMENT, FLOW RATE, FLOW TOTALIZATION, TANK FILL VALVE CONTROL, POWER STATUS. PROVIDE SYSTEMS INTEGRATION TO MONITOR LOCAL FUNCTIONS AS REQUIRED FOR: FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE. FLOW METER RATE AND TOTAL I/O TO CONNECT TO STATION RTU.
12. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
13. COORDINATE WITH EAST LOGAN WATER FOR VALVE & FITTING INSTALLATIONS (CUT–IN METHODS).



SITE #19 [ALTERNATE NEW SITE]
ELWD – DENNIS ROAD MASTER METER

2 / P13

SCALE: 1"=20'

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES:

1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU".
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: SOLAR PANEL, SOLAR CONTROLLER, BATTERY, PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
2. PROVIDE PROVIDE AND INSTALL (1 EA) NEW SOLAR POWER STATION WITH SOLAR PANEL/S
   a. SOLAR ENCLOSURE TO BE FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. ENCLOSURE AND SOLAR PANEL TO BE DESIGNED FOR POLE OR WALL MOUNT
   c. INCLUDING: SHORT CIRCUIT PROTECTION, DIGITAL SOLAR CONTROLLER, BATTERIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
3. PROVIDE AND INSTALL NEW SS UNI–STRUT STRUCTURE FOR RTU & SOLAR ENCLOSURE MOUNTINGS.
4. PROVIDE NEW ANTENNA, TOWER MAST, AND COAXIAL CABLE WITH ASSOCIATED CONNECTORS, GROUNDING AND ANCILLARY DEVICES SHALL BE PROVIDED AND INSTALLED. ANTENNA TO BE INSTALLED ON PIPE MAST MOUNTED TO THE SS RTU MOUNTING STRUCTURE AT A MINIMUM HEIGHT OF 10 FT.
5. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR.
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
6. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE NEW RTU AS REQUIRED.
7. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY EXISTING CABLING THAT IS OPEN OR EXPOSED.
8. PROVIDE NEW 4–INCH TURBO FLOW METER (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL)
   a. INSTALL NEW FLOW METER. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO–WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4–20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
9. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS, ETC.
10. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.
11. NEW VAULT SHALL BE PLACED IN EXISTING WATERLINE EASEMENT.

4			
3			
2	FOR CONSTRUCTION	06-01-18	CWW
1	FOR KDOW REVIEW	02-14-18	CWW
No	Revision	Date	By

REVISIONS

EAST LOGAN WATER DISTRICT
333 South Franklin Street
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(270) 717-0991

McGHEE ENGINEERING
202 Ewing Street
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(270) 483-9985

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:
LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
Cemetery Tank & Dennis Rd. Master Meters
Site Plans & Details

Quality On Tap!

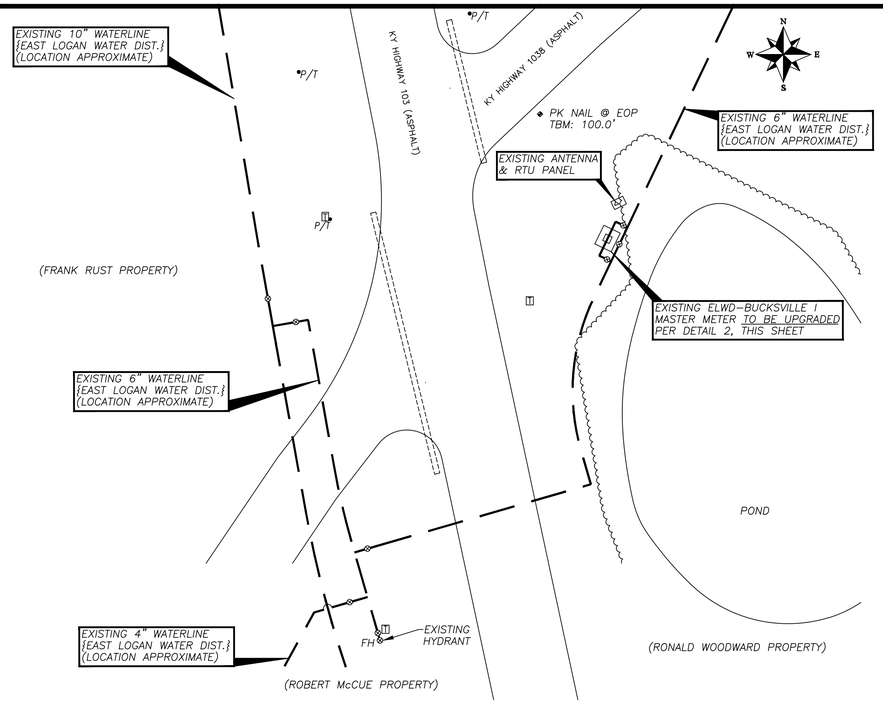
February 14, 2018

COMMONWEALTH OF KENTUCKY — CHRIS WILCUTT 21623 — LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

SHEET P-13



SITE #4 [ALTERNATE BID METHOD]
ELWD – BUCKSVILLE I MASTER METER

1 / P14

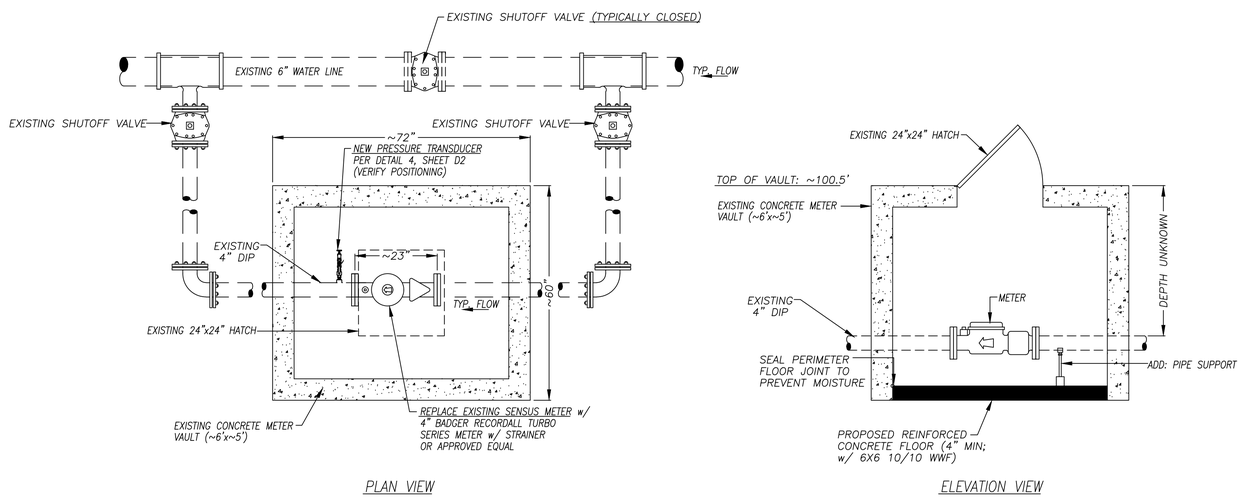
SCALE: 1"=20'

GENERAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STANDARD ELECTRICAL CODES, LATEST REVISION. ALL WIRING SHALL BE IN NEW CONDUITS.
2. ALL WORK & VAULT PENETRATIONS SHALL BE COORDINATED WITH THE EAST LOGAN WATER DISTRICT PRIOR TO THE START OF WORK AT THIS SITE. ALL WALL CUTS OR WALL PENETRATIONS SHALL BE CAULKED AND WELL SEALED TO PREVENT MOISTURE ENTRY/DAMAGE. ANY REWORK OF THE INSTALLED EQUIPMENT, DUE TO FAILURE TO COORDINATE, SHALL BE AT NO EXPENSE TO THE OWNER.

SCOPE OF WORK NOTES (BUCKSVILLE I SITE - ALTERNATE BID METHOD):

1. PROVIDE (1 EA.) NEW SOLAR POWERED SCADA REMOTE TERMINAL UNIT "RTU"
   a. FULLY ASSEMBLED HOUSED IN A NEMA 4 SS PAINTED WHITE ENCLOSURE.
   b. INCLUDING: PLC, RADIO MODEM, POWER SUPPLIES, SURGE PROTECTION, INTERFACE TERMINALS AND ALL REQUIRED ANCILLARY DEVICES FOR A COMPLETE AND WORKING UNIT.
   c. UTILIZE EXISTING SOLAR POWER UNIT ENCLOSURE. REPLACE EXISTING SOLAR POWER BATTERY WITH SIMILAR TYPE AND SIZE. REPLACE EXISTING SOLAR POWER CONTROLLER WITH DIGITAL DISPLAY TYPE CONTROLLER
2. PROVIDE AND INSTALL NEW SS UNI-STRUT STRUCTURE FOR RTU ENCLOSURE MOUNTING.
3. PROVIDE AND INSTALL (1 EA) NEW FREE-STANDING ALUMINUM RADIO COMMUNICATIONS TOWER WITH A HEIGHT AS REQUIRED BY RADIO PATH STUDY RESULTS. (MINIMUM TOWER HEIGHT SHALL BE 20 FEET). TO INCLUDE RADIO COMMUNICATIONS ANTENNA, COAXIAL CABLE, CONNECTORS, SURGE PROTECTOR, GROUNDING AND RELATED ANCILLARY DEVICES FOR A PROPERLY INSTALLED AND WORKING UNIT. (NOTE: IF RADIO PATH FADE MARGINS REQUIREMENTS CAN BE MET, THE ANTENNA/MAST MAY BE MOUNTED ON THE RTU MOUNTING STRUCTURE. THE ANTENNA MAST MUST BE SECURELY MOUNTED WITH 3 POINTS OF CONTACT. ANTENNA TO BE A MINIMUM OF 10 FEET FROM GROUND LEVEL.)
4. PROVIDE AND INSTALL NEW CONDUIT AT UNDERGROUND ENTRANCE OR EXIT POINTS TO THE RTU AS REQUIRED.
5. PROVIDE NEW CONDUIT AND SIGNAL CABLE AS REQUIRED FOR ANY NEW OR EXISTING CABLING THAT IS OPEN OR EXPOSED.
6. PROVIDE (1 EA.) NEW SYSTEM PRESSURE TRANSDUCER "SUBMERSIBLE RATED"
   a. PRESSURE TRANSDUCER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR.
   b. INSTALL PIPE SADDLE AND ISOLATION VALVE AS NEEDED FOR PRESSURE MEASURING POINT.
7. UPGRADE EXISTING METER VAULT BY POURING NEW CONCRETE FLOOR (4" MINIMUM) AS ILLUSTRATED IN DETAIL 2, THIS SHEET. PERIMETER JOINT WHERE FLOOR ABUTS VAULT SIDEWALLS SHALL BE SEALED TO PREVENT MOISTURE ENTRY FROM GROUND WATER.
8. PROVIDE NEW 4-INCH TURBO FLOW METER (1 EA.) IN EXISTING VAULT (BADGER RECORDALL TURBO SERIES w/ STRAINER OR APPROVED EQUAL).
   a. INSTALL NEW FLOW METER IN EXISTING VAULT. METER SHALL INCLUDE A SUBMERSIBLE RATED DIRECT MOUNT DIGITAL DISPLAY WITH A TWO-WIRE LOOP POWERED 4 TO 20 MA OUTPUT TO SCADA.
   b. FLOW METER SHALL INCLUDE INTEGRAL OR LOCAL SURGE PROTECTOR FOR THE 4-20MA CURRENT LOOP AT OR NEAR THE METER ELECTRONIC REGISTER.
9. PROVIDE SYSTEMS INTEGRATION AND DEVELOPMENT FOR A FULLY FUNCTIONAL RTU TO MONITOR AND CONTROL LOCAL FUNCTIONS AS REQUIRED FOR, FLOW RATE, FLOW TOTALIZATION, SYSTEM PRESSURE, POWER STATUS.
10. PROVIDE DRESSER COUPLING & DIP SPOOL AS NEEDED TO ACCOMMODATE METER REPLACEMENT IN EXISTING PIPE RUNS.
11. PROVIDE RELATED ELECTRICAL HARDWARE AND SERVICES FOR EQUIPMENT INSTALLATION AS REQUIRED.



SITE #4 [ALTERNATE BID METHOD]
ELWD – BUCKSVILLE I VAULT LAYOUT

2 / P14

SCALE: NONE

No	Revision	Date	By
1	ALT. BID METHOD	10-24-18	CWW

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(270) 483-9985

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:

LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS
Bucksville I Master Meter [Alternate Method]
Site Plans & Details

Quality On Tap!

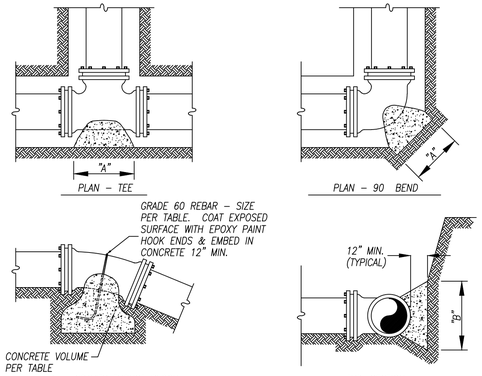
February 14, 2018

COMMONWEALTH OF KENTUCKY CHRIS WILCUTT 21623 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

SHEET P-14



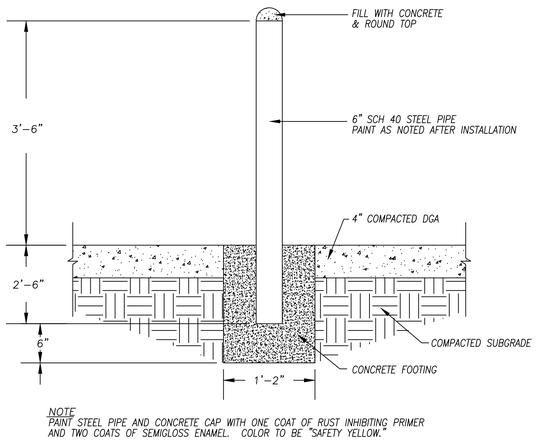
	MINIMUM BEARING AREA ("A"x"B") IN SQUARE FEET					MIN. CONC. VOLUME IN CUBIC FEET		REBAR SIZE
PIPE SIZE	TEE OR DEAD END	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	ALL FTGS.	VALVES	VALVES & FTGS.
2", 3" & 4"	1.0	1.5	1.0	1.0	1.0	2	1.5	#4
6"	2.5	3.0	2.0	1.0	1.0	5	3	#4
8"	4.0	5.5	3.0	1.5	1.0	8	5	#5
10"	6.0	8.5	4.5	2.5	1.5	13	9	#5
12"	8.5	12.0	6.5	3.0	2.0	18	12	2–#5
16"	15.0	21.5	11.5	6.0	3.0	32	21	2–#6

NOTES

1. CONCRETE FOR THRUST BLOCKS SHALL HAVE A MINIMUM 28–DAY COMPRESSIVE STRENGTH OF 2,500 PSI.
2. KEEP CONCRETE CLEAR OF JOINTS, GLAND BOLTS, ETC.
3. CONCRETE THRUST BLOCKS SHALL BE CAST AGAINST SOUND, UNDISTURBED EARTH.
4. BEARING AREAS ARE BASED ON 4,000 PSF SOIL BEARING CAPACITY. WEAKER SOILS MAY REQUIRE LARGER THRUST BLOCKS.
5. THRUST BLOCK BEARING AREAS MAY BE REDUCED IN ROCK SUBJECT TO ENGINEER'S APPROVAL.
6. VALVES REQUIRE ONE REBAR STRAP AS SHOWN IN THE TABLE AT EACH END OF THE VALVE.
7. WHERE CONTRACTOR SUSPECTS THAT UNSUITABLE BEARING CONDITIONS EXIST, NOTIFY ENGINEER PRIOR TO CASTING THRUST BLOCK.

CONCRETE THRUST BLOCKS — 1 / D1

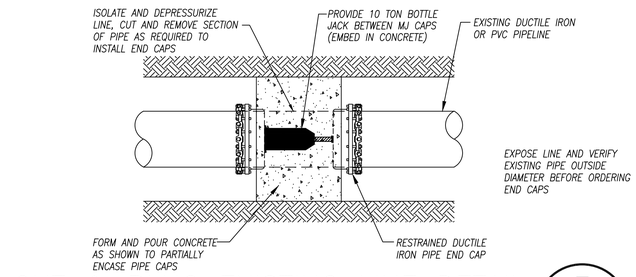
NOT TO SCALE



NOTE
PAINT STEEL PIPE AND CONCRETE CAP WITH ONE COAT OF RUST INHIBITING PRIMER AND TWO COATS OF SEMIGLOSS ENAMEL. COLOR TO BE "SAFETY YELLOW."

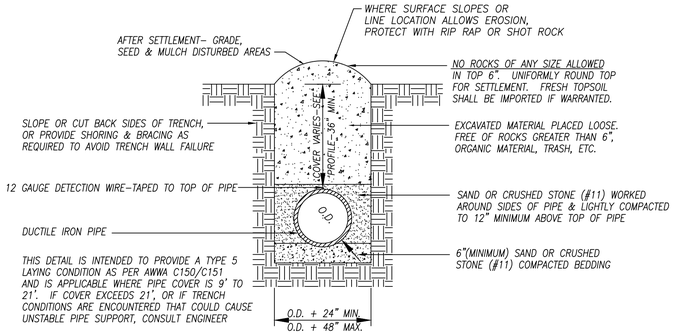
PIPE BOLLARD DETAIL — 2 / D1

NOT TO SCALE



CUT & PLUG EXISTING LINE DETAIL — 3 / D1

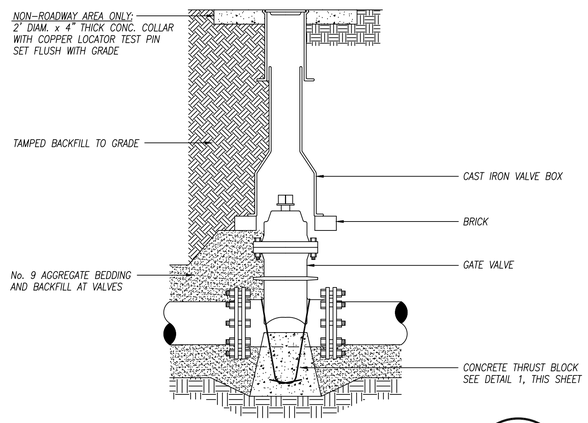
NOT TO SCALE



RESTRAINED JOINT PIPE AREAS

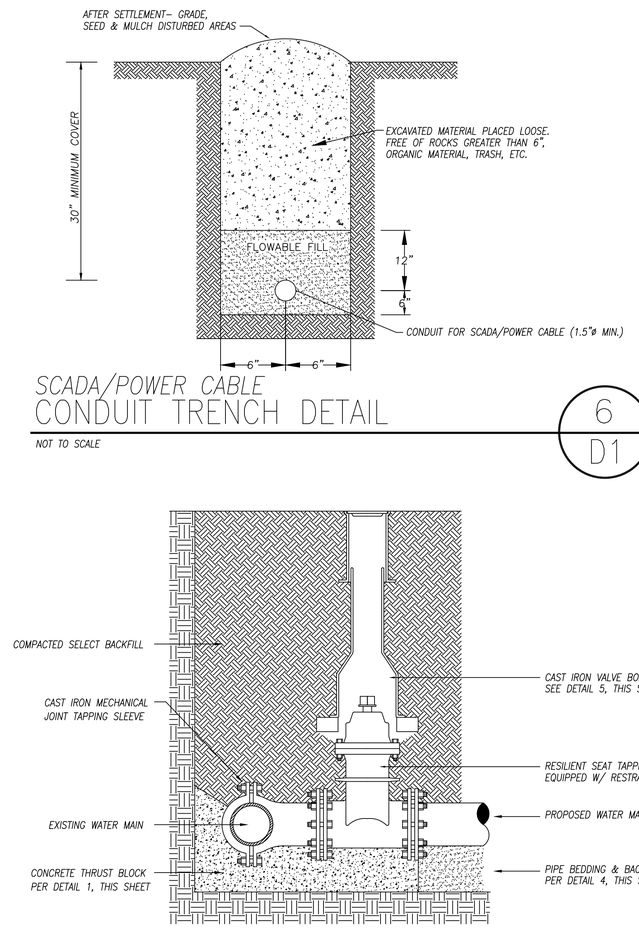
BEDDING & BACKFILL – DIP — 4 / D1

NOT TO SCALE



VALVE SETTING DETAIL — 5 / D1

NOT TO SCALE



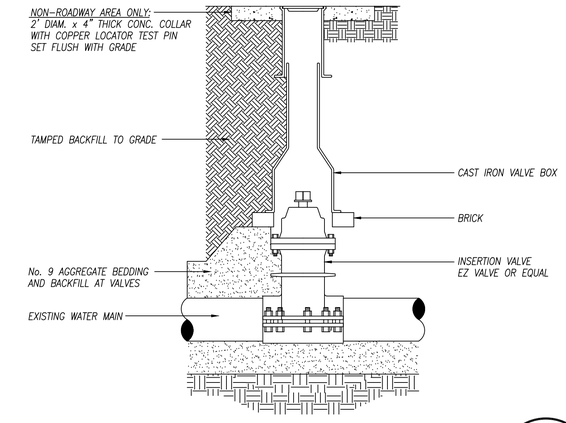
SCADA/POWER CABLE

CONDUIT TRENCH DETAIL — 6 / D1

NOT TO SCALE

TAPPING SLEEVE & VALVE — 7 / D1

NOT TO SCALE



VALVE INSERTION DETAIL — 8 / D1

NOT TO SCALE

No	Revision	Date	By
1	FOR CONSTRUCTION	06–01–18	CWW
2	FOR KDOW REVIEW	02–14–18	CWW

REVISIONS

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(270) 717-0991

FIRM: McGhee
DES BY: CWW CHK BY: MWM
DWN BY: CWW APP BY:
SCALE: AS SHOWN
PROJECT DATE: 2018
PRINTED:
LENGTH OF BAR IS 1" ON ORIGINAL DRAWING

East Logan Water District
PHASE VI SYSTEM-WIDE
SCADA IMPROVEMENTS

Miscellaneous Water Details

Quality On Tap!

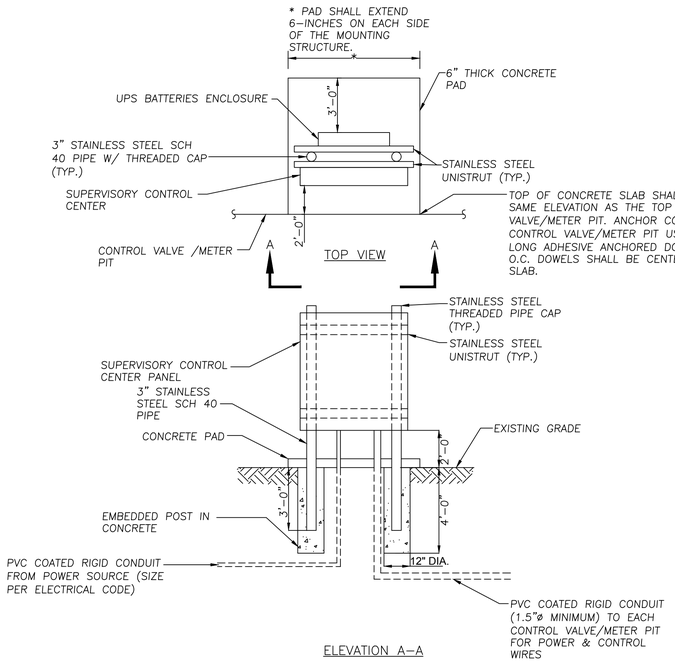
February 14, 2018

STATE OF KENTUCKY — CHRIS WILCUTT 21523 — LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

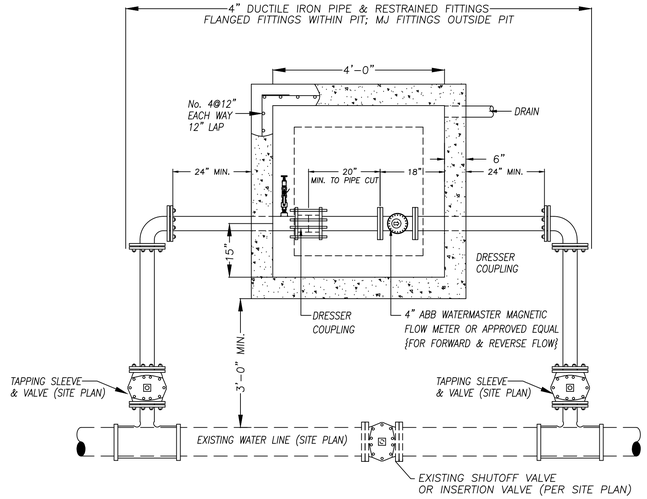
SHEET D-1



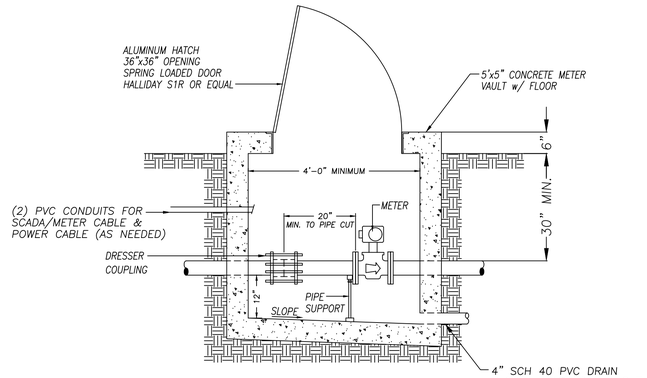
NEW INSTALLATIONS
SCC PANEL MOUNTING DETAIL

NOT TO SCALE

1 / D2



PLAN VIEW



ELEVATION VIEW

INSTALLATION NOTES:

1. THE SCADA CONDUIT SHALL BE RIGID PVC WITH SWEEPING BENDS. IT SHALL BE INSTALLED WITH A MINIMUM DEPTH OF 30" WITH A MINIMUM OF 12" FLOWABLE CONCRETE FILL ABOVE. ALSO, AN ELECTRICAL WARNING TAPE SHALL BE INSTALLED IN THE TRENCH, APPROXIMATELY 12" DEEP.
2. NEW VAULT NOTE: ALL CONCRETE SURFACES & PIPING (EXCL. METER) INSIDE THE VALVE VAULT ARE TO RECEIVE A SURFACE PREPARATION AND COATING SYSTEM EQUAL TO THE FOLLOWING TNEMEC SYSTEMS:

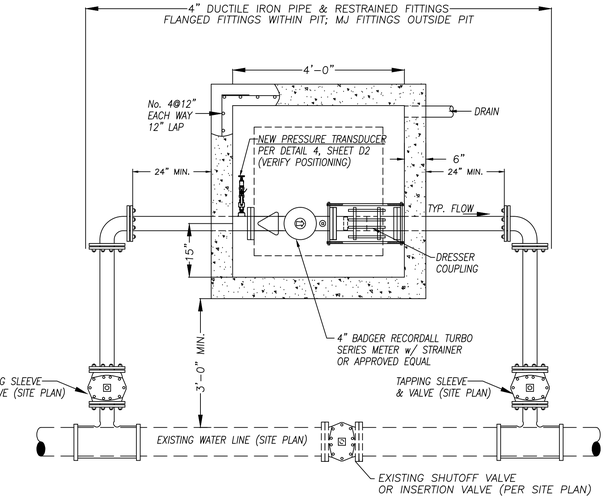
CONCRETE FLOOR	SYSTEM 67-1	GRAY (IN05)
OTHER CONCRETE	SYSTEM 66-4	WHITE (WH01)
PIPING, VALVES	SYSTEM 66-2	BLUE (GB03)

3. CONTRACTOR RESPONSIBLE FOR COORDINATING PERMANENT POWER TO MAG METER SITE, IF NOT PRESENT.

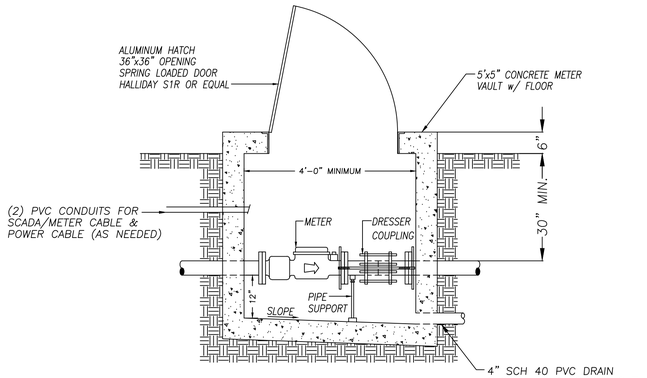
NEW MAG METER INSTALLS (TYP.)
SINGLE MAINLINE MASTER METER

NOT TO SCALE

2 / D2



PLAN VIEW



ELEVATION VIEW

INSTALLATION NOTES:

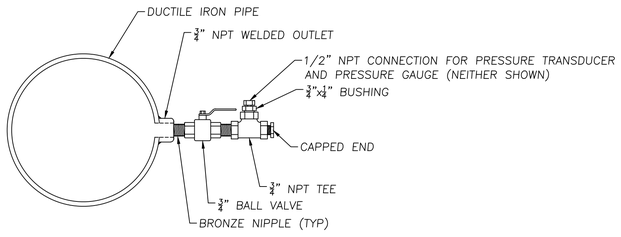
1. THE SCADA CONDUIT SHALL BE RIGID PVC WITH SWEEPING BENDS. IT SHALL BE INSTALLED WITH A MINIMUM DEPTH OF 30" WITH A MINIMUM OF 12" FLOWABLE CONCRETE FILL ABOVE. ALSO, AN ELECTRICAL WARNING TAPE SHALL BE INSTALLED IN THE TRENCH, APPROXIMATELY 12" DEEP.
2. NEW VAULT NOTE: ALL CONCRETE SURFACES & PIPING (EXCL. METER) INSIDE THE VALVE VAULT ARE TO RECEIVE A SURFACE PREPARATION AND COATING SYSTEM EQUAL TO THE FOLLOWING TNEMEC SYSTEMS:

CONCRETE FLOOR	SYSTEM 67-1	GRAY (IN05)
OTHER CONCRETE	SYSTEM 66-4	WHITE (WH01)
PIPING, VALVES	SYSTEM 66-2	BLUE (GB03)

NEW TURBO METER INSTALLS (TYP.)
SINGLE MAINLINE MASTER METER

NOT TO SCALE

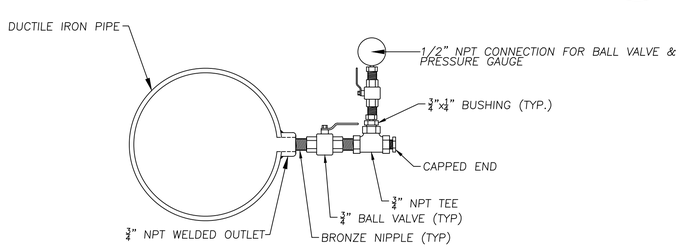
3 / D2



PRESSURE TRANSDUCER TAP

NOT TO SCALE

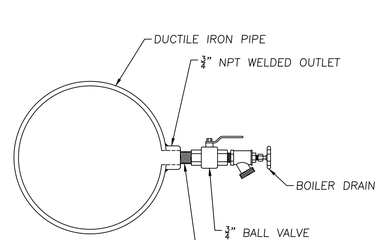
4 / D2



PRESSURE GAUGE TAP

NOT TO SCALE

5 / D2



SAMPLE TAP

NOT TO SCALE

6 / D2

4	FOR CONSTRUCTION	06-01-18	CWW
3	FOR KDOW REVIEW	02-14-18	CWW
2			
1			
No	Revision	Date	By

REVISIONS

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East Logan Water District
PHASE VI SYSTEM-WIDE SCADA IMPROVEMENTS

Miscellaneous SCADA Details

Quality On Tap!

February 14, 2018

COMMONWEALTH OF KENTUCKY CHRIS WILCUTT 21523 LICENSED PROFESSIONAL ENGINEER

Chris Wilcutt, P.E.

DRAWING NO.

SHEET D-2